

## Bill of materials

Table 1. STDES-7KWOBBC bill of materials

| Item | Q.ty | Ref. | Part/value | Description            | Manufacturer | Order code                      |
|------|------|------|------------|------------------------|--------------|---------------------------------|
| 1    | 1    | -    | -          | Table 2. Mother board  | ST           | Not available for separate sale |
| 2    | 1    | -    | -          | Table 3. IMS board     | ST           | Not available for separate sale |
| 3    | 1    | -    | -          | Table 4. Control board | ST           | Not available for separate sale |

Table 2. Mother board bill of materials

| Item | Q.ty | Ref.   | Part/value                                    | Description              | Manufacturer                    | Order code           |
|------|------|--|---|--------------------------|---------------------------------|----------------------|
| 1    | 6    | C1, C8, C39, C149, C15, C156   | 470 nF 0603 (1608 Metric) 25V ±10% X7R        | Ceramic capacitors       | Würth Electronics Inc.          | 885012206075         |
| 2    | 2    | C2, C153   | 6.8 µF 1206 (3216 Metric) 16 V ±20% X7R       | Ceramic capacitors       | TDK Corporation                 | CGA5L1X7R1C685M160AC |
| 3    | 2    | C3, C154   | 6.8 µF 1206 (3216 Metric) 16 V ±20% X7R       | Ceramic capacitors       | TDK Corporation                 | CGA5L1X7R1C685M160AC |
| 4    | 3    | C4, C7, C151   | 100 µF Radial, Can - SMD 16 V ±20%            | Aluminium capacitors     | Panasonic Electronic Components | EEE-FT1C101AR        |
| 5    | 1    | C5   | 0.1 µF 0603 (1608 Metric) 50 V ±10% X7R       | Ceramic capacitor        | Würth Electronics Inc.          | 885012206095         |
| 6    | 29   | C6, C11, C12, C82, C83, C85, C98, C100, C102, C103, C122, C195, C202, C211, C213, C215, C216, C218, C220, C221, C223, C225, C226, C228, C230, C347, C348, C349, C350 | 1 µF 0805 (2012 Metric) 50 V ±10%             | Ceramic capacitors       | Würth Elektronik                | 885012207103         |
| 7    | 1    | C9   | 100 µF 20 V 2917 (7343 Metric) 20 V ±20%      | Capacitor                | AVX Corporation                 | TAJE107M020RNJ       |
| 8    | 2    | C10, C157  | 6.8 pF 0603 (1608 Metric) 50 V 0.5 pF C0G/NP0 | Capacitors (not mounted) | Würth Electronics Inc.          | 885012006050         |
| 9    | 2    | C15, C158  | 8.2 nF 0603 (1608 Metric) 50 V ±10%           | Ceramic capacitors       | Kemet                           | C0603C822K5RACTU     |

| Item | Q.ty | Ref.   | Part/value                                | Description          | Manufacturer                            | Order code         |
|------|------|--|---|----------------------|---|--------------------|
| 10   | 3    | C16, C41, C159   | 68 nF 0603 (1608 Metric) 50 V ±10% X7R    | Ceramic capacitors   | Würth Electronics Inc.                  | 885012206094       |
| 11   | 1    | C17  | 470pF 0603 (1608 Metric) 50 V ±10% C0G    | Ceramic capacitor    | Würth Electronics Inc.                  | 885012206081       |
| 12   | 1    | C18  | 27 pF 0603 (1608 Metric) 50 V ±5% C0G/NP0 | Ceramic capacitor    | Murata Electronics North America        | GCM1885C1H270JA16D |
| 13   | 32   | C20, C23, C25, C28, C30, C31, C33, C36, C43, C45, C46, C50, C113, C114, C119, C121, C146, C147, C148, C152, C168, C194, C201, C207, C208, C212, C217, C222, C227, C285, C287, C288 | 0.1 µF 0603 (1608 Metric) 50 ±10%         | Ceramic capacitors   | Würth Elektronik                        | 885012206095       |
| 14   | 2    | C21, C22   | 47 µF 2917 (7343 Metric) ±10%             | Ceramic capacitors   | AVX Corporation                         | TAJD476K025RNJ     |
| 15   | 1    | C27  | 47 µF 2917 (7343 Metric) ±10%             | Ceramic capacitor    | AVX Corporation                         | TAJD476K010RNJ     |
| 16   | 5    | C29, C351, C352, C353, C354  | 10 µF 0805 (2012 Metric) 25 V ±10%        | Ceramic capacitors   | Samsung Electro-Mechanics America, Inc. | CL21A106KAYNNNG    |
| 17   | 2    | C32, C35   | 100 µF 25 V Radial-SMD, 6.3x5.4 mm        | Aluminium capacitors | Würth                                   | 865080445010       |
| 18   | 1    | C34  | 1 µF 1206 (3216 Metric) 50 V ±20%         | Ceramic capacitor    | Kemet                                   | C1206C105M3RACTU   |
| 19   | 11   | C37, C47, C79, C99, C162, C163, C165, C166, C199, C206, C289   | 10 nF 0603 (1608 Metric) 50 ±10%          | Ceramic capacitors   | Würth Elektronik                        | 885012206089       |
| 20   | 2    | C38, C284  | 47 µF radial-SMD, 5x5.4 mm 10 V ±20%      | Aluminium capacitors | Würth                                   | 875105242006       |
| 21   | 1    | C40  | 68 nF 0603 (1608 Metric) 50 V ±10%        | Ceramic capacitor    | Würth                                   | 885012206094       |
| 22   | 1    | C42  | 220pF 0603 (1608 Metric) 50 V ±10%        | Ceramic capacitor    | Würth                                   | 885012206079       |
| 23   | 4    | C44, C48, C286, C290   | 150 pF 0603 (1608 Metric) 50 ±10%         | Ceramic capacitors   | Würth Elektronik                        | 885012206103       |
| 24   | 2    | C49, C75   | 4.7 nF 0805 (2012 Metric) 50 V ±10%       | Ceramic capacitors   | KEMET                                   | C0805C472K5RACTU   |

| Item | Q.ty | Ref.                                   | Part/value  | Description        | Manufacturer                     | Order code          |
|------|------|--|---|--------------------|----------------------------------|---------------------|
| 25   | 4    | C51, C164, C167, C169                  | 2.2 $\mu$ F 0805 (2012 Metric) 50 V $\pm$ 10% X7R       | Ceramic capacitors | TDK Corporation                  | C2012X7R1H225K125AC |
| 26   | 2    | C52, C170                              | 10 nF 0603 (1608 Metric) 50 $\pm$ 10%                   | Ceramic capacitors | Würth Elektronik                 | 885012206089        |
| 27   | 8    | C53, C54, C67, C69, C76, C77, C93, C94 | 2.2 nF 1812 (4532 Metric) 1000 V (1kV) $\pm$ 5% C0G/NP0 | Ceramic capacitors | KEMET                            | C1812C222JDGACTU    |
| 28   | 5    | C55, C65, C66, C68, C92                | 0.1 $\mu$ F 630V 1812 (4532 Metric) 630 V $\pm$ 10%     | Ceramic capacitors | WURTH                            | 885342211006        |
| 29   | 2    | C56, C72                               | 1 $\mu$ F 630 V radial $\pm$ 20%                        | Ceramic capacitors | TDK Electronics Inc.             | B32923C3105M000     |
| 30   | 4    | C57, C58, C86, C87                     | 33 nF 1600 V radial $\pm$ 5%                            | Ceramic capacitors | Kemet                            | R75TI2330AA30J      |
| 31   | 6    | C59, C60, C64, C88, C89, C91           | 0.1 $\mu$ F 630 V 1812 (4532 Metric) 630 V $\pm$ 10%    | Ceramic capacitors | WURTH                            | 885342211006        |
| 32   | 5    | C61, C73, C107, C112, C133             | 4.7 nF radial, disc 440 V <sub>AC</sub> $\pm$ 20%       | Ceramic capacitors | KEMET                            | ERK610Z472MCRU      |
| 33   | 2    | C62, C90                               | 82 $\mu$ F radial, 22x35 mm 500                         | Ceramic capacitors | Nichicon                         | LGN2H820MELZ35      |
| 34   | 1    | C63                                    | 68 $\mu$ F radial, 22x30 mm 500                         | Ceramic capacitors | Cornell Dubilier                 | 380LX680M500H032    |
| 35   | 4    | C78, C95, C198, C205                   | 0.47 $\mu$ F 0603 (1608 Metric) 25 $\pm$ 10%            | Ceramic capacitors | Würth Elektronik                 | 885012206075        |
| 36   | 5    | C80, C96, C124, C197, C204             | 2.2 $\mu$ F SMD, 3216-18 10 V                           | Ceramic capacitors | Kemet                            | T491A225M010ATT     |
| 37   | 2    | C81, C97                               | 47 nF 0603 (1608 Metric) 50 $\pm$ 10%                   | Ceramic capacitors | Murata Electronics North America | GCM188R71H473KA55D  |
| 38   | 2    | C84, C101                              | 4.7 nF 0603 (1608 Metric) 50 $\pm$ 10% X7R              | Ceramic capacitors | Würth Elektronik                 | 885012206063        |
| 39   | 1    | C104                                   | 47 nF 0603 (1608 Metric) 50 V $\pm$ 10% X7R             | Ceramic capacitors | Murata Electronics North America | GCM188R71H473KA55D  |
| 40   | 2    | C108, C109                             | 1 $\mu$ F radial $\pm$ 20%                              | Ceramic capacitors | EPCOS (TDK)                      | B32924C3105K000     |
| 41   | 1    | C110                                   | 0.47 $\mu$ F 305 V <sub>AC</sub> X2 $\pm$ 20%           | Ceramic capacitor  | TDK                              | B32922H3474M        |
| 42   | 1    | C111                                   | 0.1 $\mu$ F radial 305 V <sub>AC</sub> $\pm$ 20%        | Ceramic capacitor  | EPCOS (TDK)                      | B32921C3104M000     |
| 43   | 2    | C115, C118                             | 470 pF 0603 (1608 metric) 50 V $\pm$ 5% C0G/NP0         | Ceramic capacitors | Würth Electronics Inc.           | 885012006061        |
| 44   | 1    | C116                                   | 1 nF 0805 (2012 metric) 100 V $\pm$ 10%                 | Ceramic capacitor  | Würth Elektronik                 | 885012207116        |
| 45   | 4    | C117, C120, C193, C200                 | 100 pF 0603 (1608 metric) 50 $\pm$ 10%                  | Ceramic capacitors | Würth Elektronik                 | 885012206077        |

| Item | Q.ty | Ref.                         | Part/value                                       | Description                      | Manufacturer                            | Order code           |
|------|------|------------------------------|--|----------------------------------|---|----------------------|
| 46   | 4    | C123, C196, C203, C283       | 4.7 $\mu$ F 0805 (2012 Metric) 25 V $\pm$ 20%    | Ceramic capacitors               | Würth Elektronik                        | 885012107018         |
| 47   | 3    | C125, C127, C128             | N.M. 0603 (1608 metric) 50 $\pm$ 10%             | Ceramic capacitors               |   |                      |
| 48   | 1    | C126                         | 10 nF 630 V radial $\pm$ 20%                     | Ceramic capacitors               | EPCOS (TDK)                             | B32921C3103M289      |
| 49   | 5    | C129, C130, C136, C137, C139 | 0.1 $\mu$ F 0603 (1608 metric) 50 V $\pm$ 10%    | Ceramic capacitors               | Würth                                   | 885012206095         |
| 50   | 2    | C131, C134                   | 2.7 nF 0603 (1608 metric) 50 V $\pm$ 10%         | Ceramic capacitors               | Samsung Electro-Mechanics               | CL10B272KB8NNNC      |
| 51   | 2    | C132, C135                   | 47 nF 0603 (1608 metric) 50 V $\pm$ 10%          | Ceramic capacitors               | Murata Electronics North America        | GCM188R71H473KA55D   |
| 52   | 2    | C138, C141                   | 2.2 $\mu$ F 0805 (2012 metric) 50 V $\pm$ 10%    | Ceramic capacitors               | TDK Corporation                         | C2012X7R1H225K125AC  |
| 53   | 1    | C140                         | 470 nF 0603 (1608 metric) 25 V $\pm$ 10%         | Ceramic capacitor                | Würth                                   | 885012206075         |
| 54   | 1    | C142                         | 22 nF 0603 (1608 metric) 50 V $\pm$ 10% X7R      | Ceramic capacitor                | Würth Elektronik                        | 885012206091         |
| 55   | 2    | C144, C145                   | 47 pF 0603 (1608 metric) 50 V $\pm$ 5% C0G       | Ceramic capacitors               | TDK Corporation                         | C1608C0G1H470J080AA  |
| 56   | 1    | C155                         | 1 $\mu$ F 0603 (1608 Metric) 50 V $\pm$ 10%      | Ceramic capacitor                | Samsung Electro-Mechanics America, Inc. | CL10A105KB8NNNC      |
| 57   | 1    | C160                         | 470 pF 0603 (1608 metric) 50 V $\pm$ 5% C0G      | Ceramic capacitor                | TDK Corporation                         | CGA3E2C0G1H471J080AD |
| 58   | 1    | C161                         | 27 pF 0603 (1608 metric) 50 V $\pm$ 5% C0G/NP0   | Ceramic capacitor                | Murata Electronics North America        | GCM1885C1H270JA16D   |
| 59   | 4    | C175, C176, C189, C190       | 150 pF 0805 (2012 metric) 50 V $\pm$ 5%          | Ceramic capacitors               | Würth Elektronik                        | 885012007058         |
| 60   | 2    | C177, C191                   | 0.1 $\mu$ F 0805 (2012 metric) 50 V $\pm$ 10%    | Ceramic capacitors               | Würth Elektronik                        | 885012207098         |
| 61   | 5    | C178, C179, C185, C186, C187 | 560 $\mu$ F radial, 35X45 pitch 10 450 $\pm$ 20% | Aluminum electrolytic capacitors | EPCOS (TDK)                             | B43268A5567M060      |
| 62   | 1    | C182                         | 0.1 $\mu$ F 630 V radial $\pm$ 20%               | Ceramic capacitor                | TDK Electronics Inc.                    | B32921C3104M000      |
| 63   | 2    | C183, C184                   | 47 nF 1210 (3225 metric) 630 V $\pm$ 20% X7R     | Ceramic capacitors               | TDK                                     | CGA6M4X7R2J473M200AA |
| 64   | 1    | C188                         | 0.047 $\mu$ F 630 V radial $\pm$ 20%             | Ceramic capacitor                | TDK Electronics Inc.                    | B32921C3473M189      |
| 65   | 1    | C192                         | 100 pF 0603 (1608 metric) 50 $\pm$ 10%           | Ceramic capacitor                | Würth Elektronik                        | 885012206077         |
| 66   | 2    | C209, C210                   | 10 pF 0603 (1608 metric) 25 V $\pm$ 5%           | Ceramic capacitors               | Würth Elektronik                        | 885012006032         |

| Item | Q.ty | Ref.   | Part/value   | Description                                     | Manufacturer                            | Order code       |
|------|------|--|--|---|---|------------------|
| 67   | 4    | C214, C219, C224, C229   | 0.22 $\mu$ F 0805 (2012 metric) 50 V $\pm$ 10%                                 | Ceramic capacitors                              | Würth Elektronik                        | 885012207100     |
| 68   | 24   | C231, C233, C235, C237, C239, C242, C244, C246, C248, C250, C252, C255, C257, C259, C261, C263, C265, C268, C270, C272, C274, C276, C278, C281 | 0.1 $\mu$ F 0603 (1608 metric) 50 V $\pm$ 10%                                  | Ceramic capacitors                              | Würth Elektronik                        | 885012206095     |
| 69   | 12   | C232, C234, C240, C245, C247, C253, C258, C260, C266, C271, C273, C279   | 4.7 $\mu$ F 0603 (1608 metric) 10 V $\pm$ 20%                                  | Ceramic capacitors                              | Würth Electronics Inc.                  | 885012106012     |
| 70   | 8    | C236, C241, C249, C254, C262, C267, C275, C280   | 100 pF 0603 (1608 metric) 50 V $\pm$ 10% C0G/NP0                               | Ceramic capacitors                              | Würth Electronics Inc.                  | 885012206077     |
| 71   | 8    | C238, C243, C251, C256, C264, C269, C277, C282   | 1 $\mu$ F 0603 (1608 metric) 50 V $\pm$ 10%                                    | Ceramic capacitors                              | Samsung Electro-Mechanics America, Inc. | CL10A105KB8NNNC  |
| 72   | 1    | C291   | 470 $\mu$ F radial-SMD, 10x10 mm 25 V $\pm$ 20%                                | Aluminium electrolytic capacitor                | Würth Elektronik                        | 865060457009     |
| 73   | 8    | C360, C361, C362, C363, C364, C365, C366, C367   | 33 pF 0603 (1608 metric) 25 $\pm$ 5%   | Ceramic capacitors                              | Würth Elektronik                        | 885012006035     |
| 74   | 11   | D1, D3, D83, D84, D85, D86, D87, D88, D89, D90, D91  | Green 0603 (1608 metric)   | Green LED diode                                 | Würth Elektronik                        | 150060VS55040    |
| 75   | 1    | D2   | STPS3150UY DO-214AA, SMB 820 mV 3A   | Automotive 150 V, 3 A power Schottky rectifier  | ST                                      | STPS3150UY       |
| 76   | 2    | D4, D82  | BZT52C9V1-7-F SOD-123 9.1 V 500 MW SOD123                                      | Zener diodes                                    | Diodes Incorporated                     | BZT52C9V1-7-F    |
| 77   | 1    | D5   | 2.7 V 500 mW DO-213AC, MINI-MELF, SOD-80 1.5V @ 200 mA 10 $\mu$ A @ 1 V 500 mW | Zener diode                                     | Vishay Semiconductor Diodes Division    | TZMB2V7-GS08     |
| 78   | 4    | D6, D15, D67, D68  | LS L296-P2Q2-1-Z 0603 (1608 metric)  | Red LED diode                                   | OSRAM Opto Semiconductors Inc.          | LS L296-P2Q2-1-Z |
| 79   | 8    | D7, D8, D9, D10, D16, D17, D18, D19  | 1N4148WS SC-90, SOD-323F 1V @ 10 mA 150 mA 75 V                                | General purpose diodes                          | Fairchild/ON Semiconductor              | 1N4148WS         |
| 80   | 8    | D11, D12, D13, D14,  | STPSC20065GY-TR D2PAK, TO-263AB  | Automotive 650 V, 20 A SiC power Schottky diode | ST                                      | STPSC20065GY-TR  |

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|------|------|---|--|---|----------------------|------------------------|
|      |      | D20, D21,<br>D22, D23   |  |   |                      |                        |
| 81   | 1    | D24   | P6KE440A<br>DO-204AC, DO-15,<br>Axial 600 W  | 600 W TVS in<br>DO-15   | ST                   | P6KE440A               |
| 82   | 1    | D26   | BZV55-B15,115<br>DO-213AC, MINI-<br>MELF, SOD-80 900<br>mV @ 10mA 50 nA<br>@ 10.5 V 500 mW     | Zener diode   | Nexperia USA<br>Inc. | BZV55-B15,115          |
| 83   | 11   | D28, D29,<br>D30, D31,<br>D32, D33,<br>D34, D36,<br>D37, D38, D39 | BAT754 SOT-23-3<br>200 mA (DC) 200<br>MA   | Schottky diodes   | Nexperia USA<br>Inc. | BAT754,215             |
| 84   | 1    | D35   | ESDCAN24-2BLY<br>TO-236-3, SC-59,<br>SOT-23-3  | Automotive dual-<br>line TVS in<br>SOT23-3L for<br>CAN bus (12 V<br>system)   | ST                   | ESDCAN24-2BLY          |
| 85   | 4    | D40, D41,<br>D45, D46   | SMAJ18A-TR<br>DO-214AC, SMA<br>400 W   | 400 W TVS in<br>SMA   | ST                   | SMAJ18A-TR             |
| 86   | 2    | D42, D47  | STBR3012G2Y-TR<br>TO-263-3, D <sup>2</sup> Pak<br>(2 Leads + Tab),<br>TO-263AB 1.3 V @<br>30 A | Automotive 1200<br>V, 30 A bridge<br>rectifier diode  | ST                   | STBR3012G2Y-TR         |
| 87   | 4    | D43, D44,<br>D48, D49   | SMAJ5.0A-TR<br>DO-214AC, SMA<br>400 W  | 400 W TVS in<br>SMA   | ST                   | SMAJ5.0A-TR            |
| 88   | 8    | D50, D52,<br>D54, D56,<br>D58, D60,<br>D62, D64                   | STTH1R06A<br>DO-214AC, SMA 1.7<br>V @ 1 A  | 600 V, 1 A Turbo<br>2 ultra-fast diode  | ST                   | STTH1R06A              |
| 89   | 8    | D51, D53,<br>D55, D57,<br>D59, D61,<br>D63, D65                   | STPS1L30A<br>DO-214AC, SMA 1 A   | 30 V, 1 A low drop<br>power Schottky<br>rectifier   | ST                   | STPS1L30A              |
| 90   | 8    | D66, D69,<br>D70, D73,<br>D74, D77,<br>D78, D81                   | STPS360AFY<br>SOD-128 3 A  | Automotive 60<br>V, 3 A power<br>Schottky rectifier   | ST                   | STPS360AFY             |
| 91   | 1    | F1  | Fuse10X38 2XClips  | Fuse  | Eaton+Mersen         | BK/1A3400-09-R+A214107 |
| 92   | 1    | HT1   | Heatsink1  | Heat-sink   | AAVID<br>THERMALLOY  |                        |
| 93   | 1    | IC1   | A6986F5V 16-<br>TSSOP (0.173", 4.40<br>mm width) exposed<br>pad                                | Automotive 38<br>V, 1.5 A<br>synchronous<br>step-down<br>switching<br>regulator with<br>30 $\mu$ A quiescent<br>current | ST                   | A6986F5V               |
| 94   | 4    | IC2, IC3, IC4,<br>IC5   | A6387D   | High-voltage high<br>and low<br>side driver   | ST                   | A6387D                 |

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|------|------|--|--|--|-----------------------------|----------------------|
|      |      |  |  | for automotive applications              |                             |                      |
| 95   | 4    | IC6, IC7, IC8, IC9   | STGAP1AS SMD SO24                                  | Galvanically isolated single gate driver | ST                          | STGAP1S              |
| 96   | 2    | ICS1, ICS2   | ACS724LLCTR-20A U-T 8-SOIC (0.154", 3.90 mm width) | Hall current sensors                     | Allegro MicroSystems, LLC   | ACS724LLCTR-20AU-T   |
| 97   | 2    | ICS3, ICS4   | ACS724LLCTR-30A B-T 8-SOIC (0.154", 3.90 mm width) | Hall current sensors                     | Allegro MicroSystems, LLC   | ACS724LLCTR-30AB-T   |
| 98   | 16   | J1, J3, J5, J7, J9, J11, J13, J15, J24, J39, J40, J43, J45, J47, J49, J52  | Con4F  | Connector headers                        | Sullins Connector Solutions | PPTC022LFBN-RC       |
| 99   | 16   | J2, J4, J6, J8, J10, J12, J14, J16, J23, J41, J42, J44, J46, J48, J50, J51 | CON4   | Connector headers                        | Molex Connector Corporation | 0015912040           |
| 100  | 1    | J22  | CONN, 10-pin                                       | Connector header                         | Sullins Connector Solutions | SBH11-PBPC-D05-ST-BK |
| 101  | 2    | J27, J32   | Jump1  | Uninsulated shorting plug                | Harwin Inc.                 | D3080-05             |
| 102  | 1    | J28  | -200-450 V   | Shank, THR                               | Würth Electronics Inc.      | 74651195R            |
| 103  | 1    | J29  | +200-450 V   | Shank, THR                               | Würth Electronics Inc.      | 74651195R            |
| 104  | 1    | J33  | P  | Shank, THR                               | Würth Electronics Inc.      | 74651195R            |
| 105  | 1    | J35  | N  | Shank, THR                               | Würth Electronics Inc.      | 74651195R            |
| 106  | 1    | J36  | Earth  | Shank, THR                               | Würth Electronics Inc.      | 74651195R            |
| 107  | 1    | J38  | Con2   | Connector header                         | Amphenol FCI                | 77311-118-02LF       |
| 108  | 11   | J55, J56, J59, J60, J63, J67, J68, J74, J75, J78, J80                      | con4-2x2-strip-female, female, 100 dual str, 4pos  | Connector headers                        | Sullins Connector Solutions | PPTC022LFBN-RC       |
| 109  | 9    | J57, J58, J61, J62, J66, J72, J76, J77, J79                                | con4-2x2-strip-male_90                             | Connector headers                        | Würth Elektronik            | 61300421021          |
| 110  | 2    | J69, J70   | con4-2x2-strip-male_90                             | Connector headers                        | Würth Elektronik            | 61300421021          |
| 111  | 10   | J81, J82, J83, J84, J85, J86, J87, J88, J89, J90                           | SpacrM4X14   | Tower                                    | Harwin Inc.                 | R40-1001402          |
| 112  | 1    | JP1  | CON2   | Terminal block                           | Würth Electronics           | 691253510002         |
| 113  | 2    | L1, L29  | 10 µH 2.5 A non-standard ±20%                      | Fixed inductors                          | TDK Corporation             | VLS5045EX-100M-CA    |

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|------|------|--|--|--|--|-------------------------------|
| 114  | 2    | L2, L3   | 70 Ohm@100 MHz<br>0603 (1608 metric)   | Ferrite beads  | Murata<br>Electronics North<br>America | BLM18SG700TN1D                |
| 115  | 1    | L4   | 6.8 µH 1.5 A 100<br>MΩ 1919 (4848<br>metric) ±30%  | Fixed inductor   | Würth<br>Electronics Inc.              | 744042006                     |
| 116  | 2    | L5, L36  | 330 Ohm@100 MHz<br>0603 (1608 metric)  | Ferrite beads  | Murata<br>Electronics North<br>America | BLM18SG331TN1D                |
| 117  | 1    | L6   | 120 Ohm@100 MHz<br>0603 (1608 metric)  | Ferrite bead   | Murata<br>Electronics North<br>America | BLM18AG121SN1D                |
| 118  | 10   | L7, L11, L14,<br>L20, L21, L27,<br>L28, L32, L33,<br>L37 | 470 Ohm 0603<br>(1608 metric)  | Ferrite beads  | Würth<br>Electronics Inc.              | 742792643                     |
| 119  | 2    | L9, L13  | 16.8 µH 30 A   | Inductors  | Würth                                  | 750344211                     |
| 120  | 2    | L10, L17   | 900 µH 32 A vertical,<br>12 PC pin   | CMC  | Würth<br>Electronics Inc.              | 7448053201                    |
| 121  | 2    | L15, L19   | 10 µH 31.5 A non-<br>standard ±15%   | Fixed inductors  | WURTH<br>ELEKTRONIK                    | S20100037                     |
| 122  | 2    | L16, L18   | 1.5 mH 38 A vertical,<br>12 PC pin 38 A  | CMC  | Würth Elektronik                       | 7448063801                    |
| 123  | 2    | L22, L25   | 33 µH 1210 (3225<br>metric) ±10%   | Fixed inductors  | Würth Elektronik                       | 744764133                     |
| 124  | 2    | L23, L26   | 10 µH 600 mA 1008<br>(2520 metric) ±20%  | Fixed inductors  | Würth Elektronik                       | 74438323100                   |
| 125  | 1    | L24  | 470 µH 1812 (4532<br>metric) ±10%  | Fixed inductors  | Würth Elektronik                       | 74476624                      |
| 126  | 2    | L30, L31   | 514 µH 26 A radial,<br>D 70 mm x H 56 mm   | Inductors  | Würth<br>Electronics Inc.              | 750344522                     |
| 127  | 2    | L34, L35   | 10 µH 30 A non-<br>standard ±15%   | Fixed inductors  | Würth<br>Electronics Inc.              | 7443641000                    |
| 128  | 1    | MOV1   | 250 V disc 20 mm   | Varistor   | EPCOS (TDK)                            | B72220S0251K101               |
| 129  | 2    | P1, P2   | CON64AB  | Connector Erni<br>284166 32X2  | ERNI                                   | 284166                        |
| 130  | 1    | P3   | CON64AB  | Connector Erni<br>284166 32X2  | ERNI                                   | 284166                        |
| 131  | 1    | P4   | CON64AB  | Connector ERNI<br>533406 32X2<br>male 90 grade                         | ERNI                                   | 384241                        |
| 132  | 7    | PS1, PS2,<br>PS3, PS4,<br>PS5, PS7, PS8                  | MGJ3T12150505MC<br>-R7 0.91" L x 0.89"<br>W x 0.58" H<br>(23.0mm x 22.6 mm<br>x 14.7 mm) | DC-DC<br>converters  | Murata Power<br>Solutions Inc.         | MGJ3T12150505MC-R7            |
| 133  | 1    | PS9  | PES1-S12-S5-M 8-<br>SMD module, 5<br>leads 1 W   | DC-DC converter  | CUI Inc.                               | PES1-S12-S5-M-TR              |
| 134  | 8    | Q1, Q2, Q3,<br>Q4, Q5, Q6,<br>Q7, Q8                     | STB47N60DM6AG<br>D2PACK  | Automotive-grade<br>N-channel 600 V,<br>70 mΩ typ., 36<br>A MDmesh DM6 | ST                                     | <a href="#">STB47N60DM6AG</a> |



| Item | Q.ty | Ref.  | Part/value  | Description   | Manufacturer    | Order code         |
|------|------|---|---|---|-----------------|--------------------|
|      |      |   |   | Power MOSFET in a D2PAK package   |                 |                    |
| 135  | 1    | Q9  | STN1NK80Z<br>TO-261-4,<br>TO-261AA 2.5 W<br>(Tc)                          | N-channel 800 V, 13 Ohm typ., 0.25 A SuperMESH Zener protected Power MOSFET in a SOT-223 package                      | ST              | STN1NK80Z          |
| 136  | 2    | Q11, Q13  | STN4NF03L<br>TO-261-4,<br>TO-261AA 3.3W (Tc)                              | N-Channel 30V - 0.039 Ohm - 4A - SOT-223 STRipFET power MOSFET  | ST              | STN4NF03L          |
| 137  | 2    | Q15, Q16  | MJD32CT4-A<br>TO-252-3, DPak (2 leads + tab), SC-63                       | Automotive-grade low voltage PNP power transistor   | ST              | MJD32CT4-A         |
| 138  | 4    | Q17, Q18, Q20, Q21  | SCTH35N65G2V-7A<br>G H2PAK-7  | Automotive-grade silicon carbide power MOSFET 650 V, 45 A, 55 mOhm (typ. T <sub>J</sub> = 25 C) in an H2PAK-7 package | ST              | SCTH35N65G2V7AG    |
| 139  | 2    | Q19, Q22  | TN3050H-12GY-TR<br>TO-263-3, D <sup>2</sup> Pak (2 leads + tab), TO-263AB | 1200 V, 30 A automotive-grade AEC-Q101 SCR thyristor  | ST              | TN3050H-12GY-TR    |
| 140  | 12   | R1, R2, R10, R11, R16, R17, R28, R140, R193, R194, R197, R223 | 0.0 0805 (2012 metric) 0.125 W, 1/8 W jumper                              | Resistors   | Yageo           | RC0805JR-070RL     |
| 141  | 2    | R3, R32   | 1 M 0603 (1608 metric) 0.1 W, 1/10 W ±1%                                  | Resistors   | TE Connectivity | CRGCQ0603F1M0      |
| 142  | 2    | R6, R198  | 249 k 0603 (1608 metric) 0.1 W, 1/10 W ±1%                                | Resistors   | Vishay          | MCT06030C2493FP500 |
| 143  | 2    | R7, R199  | 86.6 k 0603 (1608 metric) 0.1 W, 1/10 W ±1%                               | Resistors   | Stackpole       | RMCF0603FT86K6     |
| 144  | 1    | R8  | 43 k 0603 (1608 metric) 0.1 W, 1/10 W ±1%                                 | Resistors   | Panasonic       | ERJ-3EKF4302V      |
| 145  | 2    | R9, R195  | NM 0805 (2012 metric) 0.125 W, 1/8 W ±1%                                  | Resistors (not mounted)   | Any             | Any                |
| 146  | 2    | R13, R31  | 3.57 k 0603 (1608 metric) 0.1 W, 1/10 W ±1%                               | Resistors   | Yageo           | RC0603FR-073K57L   |
| 147  | 62   | R14, R15, R20, R23, R26, R29, R34, R49, R50, R70, R71, R117,  | 0.0 0603 (1608 metric) 0.1 W, 1/10 W jumper                               | Resistors   | Yageo           | RC0603JR-070RL     |

| Item | Q.ty | Ref.   | Part/value                                    | Description            | Manufacturer                    | Order code       |
|------|------|--|---|------------------------|---------------------------------|------------------|
|      |      | R118, R119, R120, R128, R129, R130, R131, R132, R133, R135, R137, R139, R141, R142, R143, R145, R148, R153, R154, R155, R156, R158, R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R177, R179, R182, R183, R184, R185, R186, R189, R190, R191, R192 |   |                        |                                 |                  |
| 148  | 3    | R21, R22, R152   | 0.0 0603 (1608 metric) 0.1 W, 1/10 W jumper   | Resistors              | Yageo                           | RC0603JR-070RL   |
| 149  | 2    | R25, R509  | N.M 0603 (1608 Metric) 0.1 W, 1/10 W jumper   | Resistors              | Yageo                           | RC0603JR-070RL   |
| 150  | 1    | R27  | 0.0 1206 (3216 metric) 0.25 W, ¼ W jumper     | Resistor               | Yageo                           | RC1206JR-070RL   |
| 151  | 1    | R30  | N.M 0603 (1608 metric) 0.1 W, 1/10 W jumper   | Resistor (not mounted) | Yageo                           | RC0603JR-070RL   |
| 152  | 1    | R33  | 75 K 0603 (1608 metric) 0.1 W, 1/10 W ±1%     | Resistor               | Yageo                           | RC0603FR-0775KL  |
| 153  | 8    | R35, R36, R38, R39, R298, R299, R300, R301   | 390 K 1206 (3216 metric) 0.25 W, 1/4 W ±1%    | Resistors              | Yageo                           | RC1206FR-07390KL |
| 154  | 3    | R37, R40, R43  | 68K 2512 (6432 metric) 2 W ±1%                | Resistors              | TE Connectivity Passive Product | 352168KFT        |
| 155  | 2    | R41, R302  | 7.5 k 005 (2012 metric) 0.125 W, 1/8 W ±1%    | Resistors              | Yageo                           | RC0805FR-077K5L  |
| 156  | 4    | R42, R48, R303, R308   | 4.02 K 0603 (1608 Metric) 0.1 W, 1/10 W ±0.1% | Resistors              | Panasonic Electronic Components | ERA-3AEB4021V    |
| 157  | 4    | R44, R46, R304, R306   | 2.2 K 0603 (1608 metric) 0.1 W, 1/10 W ±1%    | Resistors              | Yageo                           | RC0603FR-072K2L  |
| 158  | 3    | R45, R305, R520  | 39 0603 (1608 metric) 0.1 W, 1/10 W ±1%       | Resistors              | Panasonic Electronic Components | ERJ-3EKF39R0V    |

| Item | Q.ty | Ref.   | Part/value  | Description             | Manufacturer    | Order code       |
|------|------|--|---|-------------------------|-----------------|------------------|
| 159  | 2    | R47, R307  | 160 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$    | Resistors               | Yageo           | RC0603FR-07160RL |
| 160  | 2    | R51, R211  | 4.7 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$  | Resistors               |                 |                  |
| 161  | 1    | R52  | 24 Ohm 1206 (3216 Metric) 0.25 W, 1/4 W $\pm 1\%$ | Resistor                | Yageo           | RC1206FR-0724RL  |
| 162  | 2    | R53, R73   | NM 1206 (3216 metric) 0.25 W, 1/4 W $\pm 1\%$     | Resistors (not mounted) | Any             | Any              |
| 163  | 8    | R54, R55, R63, R64, R75, R76, R80, R81   | 1 2512 (6432 metric) 1 W $\pm 1\%$                | Resistors (not mounted) | Vishay Dale     | CRCW25121R00FKEG |
| 164  | 8    | R56, R57, R66, R67, R77, R78, R79, R82   | 10 k 0805 (2012 metric) 0.1 W, 1/10 W $\pm 1\%$   | Resistors               | Yageo           | RC0805FR-0710KL  |
| 165  | 2    | R58, R61   | 470 k 2512 (6432 metric) 1 W $\pm 5\%$            | Resistors               | Vishay Dale     | CRCW2512470KJNEG |
| 166  | 1    | R72  | 24 1206 (3216 Metric) 0.25 W, 1/4 W $\pm 1\%$     | Resistor                | Yageo           | RC1206FR-0724RL  |
| 167  | 6    | R74, R221, R268, R277, R286, R295  | 100 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$    | Resistors               | Yageo           | RC0603FR-07100RP |
| 168  | 12   | R83, R121, R122, R134, R136, R144, R146, R150, R187, R188, R224, R225                | 100 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$    | Resistors               | Yageo           | RC0603FR-07100RP |
| 169  | 3    | R84, R86, R90  | 165 k 1206 (3216 metric) 0.25 W, 1/4 W $\pm 1\%$  | Resistors               | Yageo           | RC1206FR-07165KL |
| 170  | 1    | R87  | 2.7 k 5329 5 W $\pm 5\%$                          | Power resistor          | TE CONNECTIVITY | SMF52K7JT        |
| 171  | 1    | R92  | 499 0805 (2012 metric) 0.125 W, 1/8 W $\pm 1\%$   | Resistor                | Stackpole       | RNCP0805FTD499R  |
| 172  | 2    | R94, R107  | 10 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$   | Resistors               | Yageo           | RC0603FR-0710KL  |
| 173  | 15   | R96, R97, R98, R99, R100, R101, R103, R104, R105, R109, R110, R111, R113, R114, R115 | 470 k 1206 (3216 metric) 0.25 W, 1/4W $\pm 1\%$   | Resistors               | Yageo           | RC1206FR-07470KL |
| 174  | 3    | R102, R106, R108   | 10 k 0805 (2012 metric) 0.1 W, 1/10 W $\pm 1\%$   | Resistors               | Yageo           | RC0805FR-0710KL  |

| Item | Q.ty | Ref.   | Part/value  | Description                  | Manufacturer   | Order code         |
|------|------|--|---|------------------------------|--|--------------------|
| 175  | 1    | R112   | 499 Ohm 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%   | Resistors                    | Stackpole  | RNCP0603FTD499R    |
| 176  | 1    | R116   | 4.99K Ohm 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1% | Resistors                    | Panasonic  | RC0603FR-074K99L   |
| 177  | 4    | R123, R124, R126, R127                         | NM 0603 (1608 metric) 0.1W, 1/10W 1%                | Chip resistors (not mounted) | Any  | Any                |
| 178  | 3    | R138, R147, R149                               | NM 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%        | Chip resistors (not mounted) | Any  | Any                |
| 179  | 1    | R151   | 120 0603 (1608 metric) 0.125 W, 1/8 W $\pm$ 1%      | Resistor                     | Vishay Beyschlag   | MCT06030C1200FP500 |
| 180  | 8    | R176, R178, R510, R511, R512, R516, R517, R518 | 1.5 K 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%     | Chip resistors               | TE Connectivity  | CRGCQ0603F1K5      |
| 181  | 2    | R180, R181                                     | 3 K 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%       | Chip resistors               | Vishay   | MCT06030C3001FP500 |
| 182  | 1    | R196   | 1 M 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%       | Resistor                     | Vishay   | CRCW06031M00FKEA   |
| 183  | 1    | R200   | 43 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%      | Resistor                     | Panasonic  | ERA-3AEB433V       |
| 184  | 2    | R201, R206                                     | 270 Ohm 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%   | Resistors                    | Vishay   | RMCF0603FT270R     |
| 185  | 4    | R202, R203, R207, R208                         | 390 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%       | Resistors                    | Yageo  | RC0603FR-07390RL   |
| 186  | 2    | R204, R209                                     | 27 2512 (6432 metric) 1 W $\pm$ 1%                  | Resistors                    | Yageo  | AC2512FK-0727RL    |
| 187  | 2    | R205, R210                                     | 1 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm$ 1%       | Resistors                    | Yageo  | RC0603FR-071KL     |
| 188  | 4    | R212, R213, R218, R219                         | 10 k 0805 (2012 metric) 0.1 W, 1/10 W $\pm$ 1%      | Resistors                    | Vishay Foil Resistors (Division of Vishay Precision Group) | Y162910K0000F9R    |
| 189  | 2    | R214, R220                                     | 100 0805 (2012 metric) 0.125 W, 1/8 W $\pm$ 1%      | Resistors                    |  |                    |
| 190  | 3    | R215, R216, R217                               | 180 K 1206 (3216 metric) 0.25 W, 1/4 W $\pm$ 0.1%   | Resistors                    | Panasonic Electronic Components                            | ERA-8AEB184V       |
| 191  | 1    | R222   | 3.6 k 0805 (2012 metric) 0.125 W, 1/8 W $\pm$ 1%    | Resistors                    | Yageo  | RC0805FR-073K6L    |

| Item | Q.ty | Ref.   | Part/value  | Description           | Manufacturer               | Order code         |
|------|------|--|---|-----------------------|----------------------------|--------------------|
| 192  | 16   | R226, R232, R235, R241, R244, R250, R253, R259, R523, R524, R525, R526, R527, R528, R529, R530 | 330 0805 (2012 metric) 0.1 W, 1/10 W $\pm 0.01\%$   | Resistors             | TE Connectivity            | CRG0805F330R       |
| 193  | 4    | R227, R236, R245, R254   | 20 1210 (3225 Metric) 0.5 W, 1/2 W $\pm 1\%$        | Resistors             | Stackpole Electronics Inc. | RMCF1210FT20R0     |
| 194  | 8    | R228, R231, R237, R240, R246, R249, R255, R258   | 1 2010 (5025 metric) 1 W $\pm 1\%$                  | Resistors             | Vishay Dale                | CRCW20101R00FKEFHP |
| 195  | 8    | R229, R233, R238, R242, R247, R251, R256, R260   | 20 2010 (5025 metric) 1 W $\pm 1\%$                 | Resistors             | Stackpole Electronics Inc. | RMCP2010FT20R0     |
| 196  | 8    | R230, R234, R239, R243, R248, R252, R257, R261   | 4.7 2010 (5025 metric) 1 W $\pm 5\%$                | Resistors             | Bourns Inc.                | CRM2010-JW-4R7ELF  |
| 197  | 8    | R262, R264, R271, R273, R280, R282, R289, R291   | 0.0 0603 (1608 metric) 0.1 W, 1/10 W jumper         | Resistors             | Yageo                      | RC0603JR-070RL     |
| 198  | 2    | R263, R265   | 750 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$      | Resistors             | Yageo                      | RC0603FR-07750RL   |
| 199  | 4    | R266, R284, R293, R521   | 2.7 Ohm 2010 (5025 metric) 1 W $\pm 1\%$            | Resistors             | Panasonic                  | ERJ-12ZYJ2R7U      |
| 200  | 4    | R267, R285, R294, R522   | 10 Ohm 2010 (5025 metric) 1 W $\pm 1\%$             | Resistors             | Stackpole Electronics Inc. | ERJ-12ZYJ100U      |
| 201  | 4    | R269, R278, R287, R296   | 2.2 1206 (3216 metric) 0.25 W, 1/4W $\pm 1\%$       | Resistors             | Bourns Inc.                | CRM1206-JW-2R2ELF  |
| 202  | 4    | R270, R279, R288, R297   | 100 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$      | Resistors             | Yageo                      | RC0603FR-07100RP   |
| 203  | 3    | R513, R514, R515   | 8.2 K 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$    | Resistors             | Panasonic                  | RC0603FR-078K2L    |
| 204  | 2    | RT1, RT2   | 10 K 0805 (2012 metric) 210 mW                      | Thermistor            | Vishay BC Components       | NTCS0805E3103FLT   |
| 205  | 2    | SP1, SP2   | SupportM3X40  | Support               | Essentra                   | TCBN-T1-M3-8-40    |
| 206  | 1    | T1   | 2000 ohm 4 A 50 V                                   | Filter                | Würth                      | 744237151          |
| 207  | 2    | T2, T4   | 750316796 0.560" L x 0.530" W (14.22 mm x 13.46 mm) | Current sense filters | Würth Electronics Inc.     | 750316796          |
| 208  | 2    | T3, T5   | XFRM_LIN/CT-SEC_0 375-425 V $\pm 10\%$              | Transformer           | WURTH                      | 750317867          |
| 209  | 1    | T6   | 7448011305 vertical, 4 PC pin 1.3 A                 | CMC                   | Würth Elektronik           | 7448011305         |

| Item | Q.ty | Ref.   | Part/value  | Description | Manufacturer         | Order code      |
|------|------|--|---|-------------|----------------------|-----------------|
| 210  | 24   | TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP58, TP59, TP60, TP61, TP62, TP63, TP64, TP65  | 5001 0.100" Dia x 0.180" L (2.54mm x 4.57mm)        | Test points | Keystone Electronics | 5001            |
| 211  | 1    | T7   | 100 µH 150 mA horizontal, 4 L-Lead                  | CMC         | EPCOS (TDK)          | B82789C0104N002 |
| 212  | 30   | TP17, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP37, TP38, TP39, TP40, TP41, TP42, TP43, TP44, TP45, TP46, TP47, TP49, TP50, TP52, TP54, TP56, TP57, TP66 | ALERT 0.079" L x 0.047" W (2.00 mm x 1.20 mm)       | Test points | Harwin Inc.          | S2751-46R       |
| 213  | 11   | TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP48, TP51, TP53, TP55   | 5001 0.100" diameter x 0.180" L (2.54 mm x 4.57 mm) | Test points | Keystone Electronics | 5001            |
| 214  | 9    | TW1, TW38, TW39, TW40, TW41, TW42, TW43, TW44, TW82  | SCREW_M4X6  | Screws      | RS Pro               | 483-0158        |
| 215  | 16   | TW2, TW4, TW5, TW6, TW7, TW8, TW10, TW11, TW12, TW13, TW14, TW49, TW50, TW54, TW56, TW81   | Con1  | Towers      | RS                   | 222-402         |
| 216  | 10   | TW3, TW9, TW15, TW17, TW53, TW55, TW57, TW70, TW71, TW72   | Con1  | Screws      | RS                   | 482-8515        |
| 217  | 3    | TW16, TW48, TW52   | SCREW_M4X6  | Screws      | RS Pro               | 483-0158        |
| 218  | 20   | TW18, TW19, TW20, TW21, TW22, TW23, TW24, TW25, TW26, TW27, TW28, TW29,  | Con1  | Screws      | RS                   | 482-8515        |

| Item | Q.ty | Ref.   | Part/value  | Description  | Manufacturer     | Order code     |
|------|------|--|---|--|------------------|----------------|
|      |      | TW30, TW31, TW32, TW33, TW34, TW35, TW36, TW37 |   |  |                  |                |
| 219  | 2    | TW47, TW51                                     | Spacer M4x12  | Spacers  | Würth Elektronik | 970120474      |
| 220  | 3    | TW58, TW61, TW65                               | Screw_M3X6  | Screws   | RS               | 482-8515       |
| 221  | 8    | TW59, TW62, TW64, TW68, TW73, TW74, TW75, TW76 | SpacerM3X40   | Spacers  | Würth Elektronik | 971400324      |
| 222  | 4    | TW60, TW63, TW66, TW69                         | Screw_M3X6  | Screws   | RS               | 482-8515       |
| 223  | 4    | TW77, TW78, TW79, TW80                         | Con1  | Screws   | RS               | 482-8515       |
| 224  | 2    | U1, U16  | A6986F 16-TSSOP (0.173", 4.40 mm width) exposed pad | Automotive 38 V, 1.5 A synchronous step-down switching regulator with 30 $\mu$ A quiescent current | ST               | A6986F         |
| 225  | 1    | U2   | LF50CDT-TRY TO-252-3, DPak (2 leads + tab), SC-63   | Very low drop voltage regulator with inhibit   | ST               | LF50CDT-TRY    |
| 226  | 3    | U3, U4, U7                                     | ESDA6V1LY TO-236-3,SC-59,SO T-23-3                  | Automotive dual Transil array for ESD protection   | ST               | ESDA6V1LY      |
| 227  | 1    | U5   | L4931ABD120TR 8-SOIC (0.154", 3.90 mm width)        | Very low drop voltage regulators with inhibit  | ST               | L4931ABD120TR  |
| 228  | 1    | U6   | ESDA14V2LY TO-236-3,SC-59,SO T-23-3                 | Automotive dual Transil array for ESD protection   | ST               | ESDA14V2LY     |
| 229  | 2    | U8, U28  | TSZ121IYLT SC-74A, SOT-753                          | Very high accuracy (5 $\mu$ V) zero drift 5 V CMOS Op-Amp, single, GBP = 400 kHz                   | ST               | TSZ121IYLT     |
| 230  | 2    | U9, U27  | ACPL-782T-500E 8-SMD, Gull Wing                     | Opamp  | Broadcom Limited | ACPL-782T-500E |
| 231  | 3    | U10, U12, U14                                  | BAR43SFILM TO-236-3, SC-59, SOT-23-3 100 mA         | 30 V, 100 mA Vf 0.33 V @ 2 mA SMD general purpose signal Schottky diode                            | ST               | BAR43SFILM     |
| 232  | 1    | U11  | TS3021HIYLT SC-74A, SOT-753                         | Rail-to-rail 1.8 V high-speed comparator, 150°C extended temperature range                         | ST               | TS3021HIYLT    |
| 233  | 1    | U13  | TSV611ILT SC-74A, SOT-753, SOT23-5L                 | Rail to rail input/output 5 V CMOS Op-Amp, micro-  | ST               | TSV611ILT      |

| Item | Q.ty | Ref.  | Part/value   | Description                              | Manufacturer         | Order code     |
|------|------|---|--|--|----------------------|----------------|
|      |      |   |  | power (10 uA),<br>GBP = 120 kHz          |                      |                |
| 234  | 1    | U15   | LTC2875HS8#PBF<br>8-SOIC (0.154",<br>3.90mm Width) | IC TXRX CAN                              | Linear<br>Technology | LTC2875HS8#PBF |
| 235  | 2    | U17, U18  | ACPL-K49T-000E<br>8-SOIC (0.268",<br>6.81mm Width) | Optoisolator<br>transistors              | Broadcom<br>Limited  | ACPL-K49T-000E |
| 236  | 8    | U19, U20,<br>U21, U22,<br>U23, U24,<br>U25, U26 | ACPL-K72T-060E                                     | High speed<br>automotive<br>optocouplers | Broadcom/Avago       | ACPL-K72T-060E |

**Table 3. IMS board bill of materials**

| Item | Q.ty | Ref.   | Part/value   | Description   | Manufacturer                      | Order code                      |
|------|------|--|--|---|-----------------------------------|---------------------------------|
| 1    | 8    | C53, C54, C67,<br>C69, C76, C77,<br>C93, C94   | 2.2 nF 1812 (4532<br>metric) 1000 V (1 kV)<br>±5%  | Capacitors (not<br>mounted)   | KEMET                             | C1812C222JDGACTU                |
| 2    | 6    | C59, C60, C64,<br>C88, C89, C91  | 0.1 µF 630 V 1812<br>(4532 metric) 630<br>±10%   | Ceramic<br>capacitors   | Wurth Elektronik                  | 885342211006                    |
| 3    | 4    | C175, C176,<br>C189, C190  | 150 pF 0805 (2012<br>metric) 50 V ±5%  | Ceramic<br>capacitors   | Wurth Elektronik                  | 88501207058                     |
| 4    | 2    | C177, C191   | 0.1 µF 0805 (2012<br>Metric) 50 V ±10%   | Ceramic<br>capacitors   | Wurth Elektronik                  | 885012207098                    |
| 5    | 8    | D11, D12, D13,<br>D14, D20, D21,<br>D22, D23   | STPSC20065GY-TR<br>D2PAK   | Automotive 650<br>V, 20 A SiC<br>power Schottky<br>diode  | ST                                | <a href="#">STPSC20065GY-TR</a> |
| 6    | 4    | D40, D41, D45,<br>D46  | SMAJ18A-TR<br>DO-214AC, SMA<br>400 W   | 400 W TVS in<br>SMA   | ST                                | <a href="#">SMAJ18A-TR</a>      |
| 7    | 2    | D42, D47   | STBR3012G2Y-TR<br>TO-263-3, D <sup>2</sup> Pak<br>(2 leads + tab),<br>TO-263AB 1.3 V @<br>30 A | Automotive 1200<br>V, 30 A bridge<br>rectifier diode  | ST                                | <a href="#">STBR3012G2Y-TR</a>  |
| 8    | 4    | D43, D44, D48,<br>D49  | SMAJ5.0A-TR<br>DO-214AC, SMA<br>400W   | 400 W TVS in<br>SMA   | ST                                | <a href="#">SMAJ5.0A-TR</a>     |
| 9    | 2    | BX1, BX2   | BOX  | Aluminium boxes<br>(not mounted)  | HAMMOND                           | 1550P                           |
| 10   | 16   | J2, J4, J6, J8,<br>J10, J12, J14,<br>J16, J23, J41,<br>J42, J44, J46,<br>J48, J50, J51 | CON4   | Connector<br>headers  | Molex<br>Connector<br>Corporation | 0015912040                      |
| 11   | 8    | Q1, Q2, Q3, Q4,<br>Q5, Q6, Q7, Q8  | STB47N60DM6AG<br>D2PACK  | Automotive-grade<br>N-channel 600 V,<br>70 mOhm typ.,<br>36 A MDmesh<br>DM6 Power<br>MOSFET in a<br>D2PAK package | ST                                | <a href="#">STB47N60DM6AG</a>   |



| Item | Q.ty | Ref.   | Part/value  | Description   | Manufacturer         | Order code       |
|------|------|--|---|---|----------------------|------------------|
| 12   | 4    | Q17, Q18, Q20, Q21   | SCTH35N65G2V-7A<br>G H2PAK-7  | Automotive-grade silicon carbide Power MOSFET 650 V, 45 A, 55 mOhm (typ. T <sub>J</sub> = 25 C) in an H2PAK-7 package | ST                   | SCTH35N65G2V7AG  |
| 13   | 2    | Q19, Q22   | TN3050H-12GY-TR<br>TO-263-3, D <sup>2</sup> Pak<br>(2 leads + tab),<br>TO-263AB | 1200 V, 30 A automotive-grade AEC-Q101 SCR thyristor  | ST                   | TN3050H-12GY-TR  |
| 14   | 8    | R54, R55, R63, R64, R75, R76, R80, R81   | 1 2512 (6432 metric)<br>1 W ±1%   | Resistors   | Vishay Dale          | CRCW25121R00FKEG |
| 15   | 12   | R56, R57, R66, R67, R77, R78, R79, R82, R212, R213, R218, R219   | 10k 0805 (2012 metric) 0.1 W, 1/10 W ±1%  | Resistors   | Yageo                | RC0805FR-0710KL  |
| 16   | 2    | R204, R209   | 27 2512 (6432 Metric) 1W 1%   | Resistors   | Yageo                | AC2512FK-0727RL  |
| 17   | 2    | R214, R220   | 100 0805 (2012 Metric) 0.125W, 1/8W 1%  | Resistors   |                      |                  |
| 18   | 2    | RT1, RT2   | 10K 0805 (2012 Metric) 210mW  | Thermistors   | Vishay BC Components | NTCS0805E3103FLT |
| 19   | 16   | TW2, TW4, TW5, TW6, TW7, TW8, TW10, TW11, TW12, TW13, TW14, TW49, TW50, TW54, TW56, TW81                               | Con1  | Towers  | RS                   | 222-402          |
| 20   | 20   | TW18, TW19, TW20, TW21, TW22, TW23, TW24, TW25, TW26, TW27, TW28, TW29, TW30, TW31, TW32, TW33, TW34, TW35, TW36, TW37 | Con1  | Screws  | RS                   | 482-8515         |
| 21   | 2    | TW47, TW51   | Spacer M4x12<br>M4x12   | Spacers   | Würth Elektronik     | 970120474        |
| 22   | 1    | IMS PCB  | (90.4x63.8mm + 203x138.5 mm) x 1.63mm   | IMS PCB   | -                    | -                |

**Table 4. Control board bill of materials**

| Item | Q.ty | Ref.   | Part/value                          | Description        | Manufacturer | Order code       |
|------|------|--|-------------------------------------|--------------------|--------------|------------------|
| 1    | 24   | C1, C3, C5, C6, C9, C10, C13, C30, C31, C33, C35, C37, C40, C42, | 0.1 µF 0603 (1608 Metric) 50 V ±10% | Ceramic capacitors | KEMET        | C0603C104K5RACTU |

| Item | Q.ty | Ref.  | Part/value                           | Description          | Manufacturer                            | Order code            |
|------|------|---|--------------------------------------|----------------------|---|-----------------------|
|      |      | C45, C48, C51, C57, C59, C60, C72, C73, C76, C81  |                                      |                      |   |                       |
| 2    | 2    | C2, C4  | 15 pF 0603 (1608 Metric) 25 V ±10%   | Ceramic capacitors   | Any                                     | Any                   |
| 3    | 21   | C7, C8, C11, C12, C32, C34, C36, C38, C41, C43, C46, C49, C52, C55, C58, C62, C64, C66, C68, C74, C84 | 10 nF 0603 (1608 metric) 50 V ±5%    | Ceramic capacitors   | AVX Corporation                         | 06035C103JAT2A        |
| 4    | 2    | C14, C15  | 6 pF 0603 (1608 metric) 50 V ±10%    | Ceramic capacitors   | Any                                     | Any                   |
| 5    | 14   | C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29                                  | 100 pF 0603 (1608 metric) 50 V ±5%   | Ceramic capacitors   | Murata Electronics North America        | GRM1885C1H101JA01D    |
| 6    | 3    | C39, C69, C70   | 2.2 µF 0603 (1608 metric) 16 V ±20%  | Ceramic capacitors   | TDK Corporation                         | CGA3E1X7S1C225M080A C |
| 7    | 5    | C44, C47, C50, C53, C56   | 4.7 µF 0805 (2012 metric) 10 V ±10%  | Ceramic capacitors   | Murata Electronics North America        | GCM21BC71A475KA73L    |
| 8    | 1    | C54   | 0.1 µF 0603 (1608 metric) 16 V ±10%  | Ceramic capacitor    | Würth Electronics Inc.                  | 885012206046          |
| 9    | 4    | C61, C63, C65, C67  | 47 nF 0603 (1608 metric) 50 V ±10%   | Ceramic capacitors   | Murata Electronics North America        | GCM188R71H473KA55D    |
| 10   | 1    | C71   | 1 µF 0603 (1608 metric) 50 V ±10%    | Ceramic capacitors   | Samsung Electro-Mechanics America, Inc. | CL10A105KB8NNNC       |
| 11   | 3    | C75, C79, C91   | 6.8 µF 1206 (3216 metric) 16 V ±20%  | Ceramic capacitors   | TDK Corporation                         | CGA5L1X7R1C685M160A C |
| 12   | 4    | C77, C80, C86, C94  | 100 µF radial, Can - SMD 16 V ±20%   | Aluminium capacitors | Panasonic Electronic Components         | EEE-FT1C101AR         |
| 13   | 4    | C78, C82, C92, C96  | 470 nF 0603 (1608 metric) 25 V ±10%  | Ceramic capacitors   | Würth Electronics Inc.                  | 885012206075          |
| 14   | 1    | C83   | 10 µF 1206 (3216 metric) 16 V ±10%   | Ceramic capacitor    | AVX Corporation                         | TAJA106K016RNJ        |
| 15   | 1    | C85   | 0.47 µF 1206 (3216 metric) 50 V ±10% | Ceramic capacitor    | Würth Electronics Inc.                  | 885012208091          |
| 16   | 2    | C87, C98  | 8.2 nF 0603 (1608 metric) 50 V ±5%   | Ceramic capacitors   | TDK Corporation                         | CGA3E2NP01H822J080AA  |
| 17   | 1    | C88   | 470 pF 0603 (1608 metric) 50 V ±5%   | Ceramic capacitor    | TDK Corporation                         | CGA3E2C0G1H471J080A D |

| Item | Q.ty | Ref.                              | Part/value                                | Description                     | Manufacturer                       | Order code           |
|------|------|-----------------------------------|---|---------------------------------|------------------------------------|----------------------|
| 18   | 1    | C89                               | 27 pF 0603 (1608 metric) 50 V ±5%         | Ceramic capacitor               | Murata Electronics North America   | GCM1885C1H270JA16D   |
| 19   | 2    | C90, C99                          | 68 nF 0603 (1608 metric) 50 V ±10%        | Ceramic capacitors              | KEMET                              | C0603C683K5RACTU     |
| 20   | 1    | C93                               | 22 µF 1206 (3216 metric) 6.3 V ±20%       | Ceramic capacitor               | TDK Corporation                    | CGA5L1X7R0J226M160AC |
| 21   | 1    | C95                               | 0.1 µF 0603 25 V ±10%                     | Ceramic capacitor               | Kemet                              | C0603C104K3RAC       |
| 22   | 1    | C97                               | 6.8 pF 0603 (1608 metric) 50 V 0.5 pF     | Ceramic capacitor               | Würth Electronics Inc.             | 885012006050         |
| 23   | 1    | C100                              | 820 pF 0603 (1608 metric) 50 V ±10%       | Ceramic capacitor               |                                    |                      |
| 24   | 1    | C101                              | 47 pF 0603 (1608 metric) 50 V ±5%         | Ceramic capacitor               | TDK Corporation                    | C1608C0G1H470J080AA  |
| 25   | 1    | C102                              | 6.8 pF 0603 (1608 metric) 50 V 0.5 pF     | Ceramic capacitor (not mounted) | Würth Electronics Inc.             | 885012006050         |
| 26   | 1    | D1                                | LED BLUE 0402 (1005 metric) 5 mA          | Blue LED                        | Vishay Semiconductor Opto Division | VLMB1500-GS08        |
| 27   | 2    | D2, D5                            | LED RED 0402 (1005 metric) 20 mA          | Red LED                         | Vishay Semiconductor Opto Division | VLMS1500-GS08        |
| 28   | 2    | D3, D4                            | LED YELLOW-GREEN 0402 (1005 metric) 20 mA | Yellow-green LED                | Vishay Semiconductor Opto Division | VLMG1500-GS08        |
| 29   | 2    | J1, J2                            | USART_CON                                 | Connectors                      | TE Connectivity AMP Connectors     | 215079-4             |
| 30   | 3    | J3, J4, J5                        | JUMPER-con2-strip-male                    | Jumpers                         | Any                                | Any                  |
| 31   | 1    | J6                                | JTAG                                      | Connector header                | Sullins Connector Solutions        | SBH11-PBPC-D07-ST-BK |
| 32   | 2    | J7, J9                            | Con3                                      | Headers                         | Harwin Inc.                        | M20-9990345          |
| 33   | 1    | J8                                | SWD/COM                                   | Connector header                | Any                                | Any                  |
| 34   | 1    | J10                               | JUMPER                                    | Connector header                | Any                                | Any                  |
| 35   | 2    | J11, J14                          | JUMPER                                    | Jumpers                         | Any                                | Any                  |
| 36   | 1    | J12                               | EXT SUPPLY                                | Terminal block                  | Phoenix Contact                    | 1725656              |
| 37   | 1    | J13                               | GND CON                                   | Connector header                |                                    |                      |
| 38   | 7    | J15, J16, J17, J18, J19, J20, J21 | Jumper_Female                             | Jumpers                         | Sullins Connector Solutions        | QPC02SXGN-RC         |
| 39   | 3    | L1, L2, L4                        | 470 OHM 0402 (1005 metric)                | Ferrite beads                   | Würth Electronics Inc.             | 7427927141           |
| 40   | 1    | L3                                | 10 µH 2.5A non-standard ±20%              | Fixed inductor                  | TDK Corporation                    | VLS5045EX-100M-CA    |
| 41   | 1    | L5                                | 8.2 µH-2.8A non-standard ±20%             | Fixed inductor                  | Würth Electronics Inc.             | 78438357082          |

| Item | Q.ty | Ref.   | Part/value                                     | Description                         | Manufacturer                    | Order code       |
|------|------|--|--|-------------------------------------|---------------------------------|------------------|
| 42   | 1    | P1   | Digital power connector                        | Connector Erni 90° 384241 32X2 male | ERNI                            | 384241           |
| 43   | 1    | Q1   | BC847ALT1G<br>TO-236-3, SC-59,<br>SOT-23-3     | Transistor                          | ON Semiconductor                | BC847ALT1G       |
| 44   | 2    | R1, R6   | 39 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%     | Resistors                           | Panasonic Electronic Components | ERJ-3EKF39R0V    |
| 45   | 2    | R2, R5   | 820 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%    | Resistors                           | Yageo                           | RC0603FR-07820RL |
| 46   | 2    | R3, R8   | 47 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%     | Resistors                           | Yageo                           | RC0603FR-0747RL  |
| 47   | 8    | R4, R7, R9,<br>R12, R30,<br>R59, R62, R63  | 0 0603 (1608 metric)<br>0.1 W, 1/10 W jumper   | Resistors                           | Panasonic Electronic Components | ERJ-3GEY0R00V    |
| 48   | 4    | R10, R11,<br>R13, R14  | 0 2512 (6432 metric) 1<br>W jumper             | Resistors (not mounted)             | Yageo                           | RC2512JK-070RL   |
| 49   | 17   | R15, R16,<br>R19, R20,<br>R21, R22,<br>R25, R26,<br>R27, R28,<br>R29, R31,<br>R48, R49,<br>R53, R54, R79 | 10 k 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%   | Resistors                           | Yageo                           | RC0603FR-0710KL  |
| 50   | 4    | R17, R18,<br>R23, R24  | 4.99 k 0603 (1608 metric)<br>0.1 W, 1/10 W ±1% | Resistors                           | Vishay Dale                     | CRCW06034K99FKEA |
| 51   | 1    | R32  | 470 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%    | Resistor                            |                                 |                  |
| 52   | 1    | R33  | 390 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%    | Resistor                            | Yageo                           | RC0603FR-07390RL |
| 53   | 14   | R34, R35,<br>R36, R37,<br>R38, R39,<br>R40, R41,<br>R42, R43,<br>R44, R45,<br>R46, R47                   | 10 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%     | Resistors                           |                                 |                  |
| 54   | 2    | R50, R52   | 0 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%      | Resistors                           |                                 |                  |
| 55   | 1    | R51  | 0 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%      | Resistor (not mounted)              |                                 |                  |
| 56   | 1    | R55  | 0 0603 (1608 metric)<br>0.1 W, 1/10 W jumper   | Resistor (not mounted)              | Panasonic Electronic Components | ERJ-3GEY0R00V    |
| 57   | 4    | R56, R57,<br>R58, R60  | 0 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%      | Resistors                           |                                 |                  |
| 58   | 2    | R61, R64   | 0 0603 (1608 metric)<br>0.1 W, 1/10 W ±1%      | Resistor (not mounted)              |                                 |                  |

| Item | Q.ty | Ref.   | Part/value  | Description | Manufacturer         | Order code        |
|------|------|--|---|-------------|----------------------|-------------------|
| 59   | 2    | R65, R66   | 100 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$    | Resistors   | Yageo                | RC0603FR-07100RP  |
| 60   | 1    | R67  | 470 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$    | Resistor    |                      |                   |
| 61   | 1    | R68  | 680 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$    | Resistor    |                      |                   |
| 62   | 2    | R69, R74   | 0 1206 (3216 metric) 0.25 W, 1/4W jumper          | Resistors   | Yageo                | RC1206JR-070RL    |
| 63   | 2    | R70, R75   | 1M 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$     | Resistors   | Vishay Dale          | CRCW06031M00FKEAC |
| 64   | 1    | R71  | 249 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$  | Resistor    |                      |                   |
| 65   | 1    | R72  | 86.6 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$ | Resistor    |                      |                   |
| 66   | 1    | R73  | 43 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$   | Resistor    |                      |                   |
| 67   | 1    | R76  | 220 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$  | Resistor    |                      |                   |
| 68   | 1    | R77  | 560 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$  | Resistor    |                      |                   |
| 69   | 1    | R78  | 24 k 0603 (1608 metric) 0.1 W, 1/10 W $\pm 1\%$   | Resistor    |                      |                   |
| 70   | 1    | SW1  | Miniswitch-KMR211GLFS 4.60 mm x 2.80 mm           | Switch      | C&K                  | KMR211GLFS        |
| 71   | 54   | TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP36, TP37, TP38, TP39, TP40, TP41, TP42, TP43, TP44, TP45, TP46, TP47, TP48, TP49, TP50, | 5001 0.100" Dia x 0.180" L (2.54 mm x 4.57 mm)    | Test points | Keystone Electronics | 5001              |

| Item | Q.ty | Ref.                      | Part/value  | Description  | Manufacturer            | Order code       |
|------|------|---------------------------|---|--|-------------------------|------------------|
|      |      | TP52, TP53,<br>TP54, TP55 |   |  |                         |                  |
| 72   | 1    | TP51                      | VDD_LV 0.100" Dia x<br>0.180" L (2.54 mm x<br>4.57 mm)    | Test point   | Keystone<br>Electronics | 5001             |
| 73   | 2    | U1, U2                    | LTV-0601 8-SOIC<br>(0.154", 3.90 mm<br>width)             | Optoisolators  | Lite-On Inc.            | LTV-0601         |
| 74   | 4    | U3, U4, U5,<br>U6         | TS3011IYLT SC-74A,<br>SOT-753                             | Rail-to-rail high-<br>speed comparators  | ST                      | TS3011IYLT       |
| 75   | 4    | U9, U10, U11,<br>U12      | DA108S1RL 8-SOIC<br>(0.154", 3.90 mm<br>width)            | Diode arrays   | ST                      | DA108S1RL        |
| 76   | 1    | U13                       | STM6315RDW13F<br>TO-253-4, TO-253AA                       | Open drain<br>microprocessor<br>reset  | ST                      | STM6315RDW13F    |
| 77   | 2    | U14, U15                  | A6986F 16-TSSOP<br>(0.173", 4.40 mm<br>width) exposed pad | Automotive 38<br>V, 1.5 A<br>synchronous<br>step-down<br>switching<br>regulator with 30<br>µA quiescent<br>current | ST                      | A6986F           |
| 78   | 1    | U7                        | SN74AHC32MPWREP<br>14-TSSOP (0.173",<br>4.40mm width)     | IC gate  | Texas Instruments       | SN74AHC32MPWREP  |
| 79   | 1    | U8                        | SPC58NN84E7RMHB<br>R LQFP 176<br>24x24x1.4                | 32-bit power<br>architecture<br>MCU for high<br>performance<br>applications  | ST                      | SPC58NN84E7RMHBR |
| 80   | 1    | Y1                        | 40 MHz 0.098" L x<br>0.079" W (2.50 mm x<br>2.00 mm)      | Crystal  | ECS Inc.                | ECS-400-8-36CKM  |

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### RESTRICTIONS AND WARNINGS

Before You handle or use the Evaluation Board, You must carefully review any related documentation provided by ST. Such documentation may contain important warnings. You shall comply with all such warnings and other instructions and employ reasonable safety precautions in using the Evaluation Board. Failure to do so may result in death, personal injury, or property damage. If You have any questions regarding the safe usage of the Evaluation Board, You should contact ST for guidance.

You may not sell, assign, sublicense, lease, rent or otherwise distribute the Evaluation Board for commercial purposes, in whole or in part, or use Evaluation Board in a production system, with the exception that if You are an authorized ST distributor, You may resell the Evaluation Board in compliance with the applicable terms and conditions. Except as provided in this Agreement or as explicitly permitted in the documentation of the Evaluation Board, You may not reproduce the Evaluation Board or modify, reverse engineer, de-compile or disassemble its software and/or firmware, in whole or in part.

You shall not use the Evaluation Board in any safety critical or functional safety testing, including but not limited to testing of life supporting, military or nuclear applications. ST expressly disclaims any responsibility for such usage which shall be made at Your sole risk, even if ST has been informed in writing of such usage. Unless expressly designated in writing by ST as suitable for use in testing automotive or aerospace applications, You shall not use the Evaluation Board in such testing.

### Notice applicable to Evaluation Boards according to European Regulation

For the European Regulation of the Evaluation Board, the applicable EU directives are considered, with a particular attention to the Low Voltage Directive (LVD) 2014/35/EU, the Electromagnetic Compatibility (EMC) Directive 2014/30/EU, and the Radio Equipment Directive (RED) 2014/53/EU. If the Evaluation Board is outside the scope of the foregoing Directives, then the General Product Safety Directive (GPSD) 2001/95/EC and Council Directive 93/68/EEC, amending Directive 73/23/EEC on electrical equipment designed for use within certain voltage limits, are applicable.

The Evaluation Board meets the requirements of the Restriction of Hazardous Substances (RoHS 2 or RoHS recast) Directive 2011/65/EU, Annex II, as amended by Directive 2015/863/EU.

### Notice applicable to Evaluation Boards not FCC-Approved

This kit is designed to allow:

1. Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and
2. Software developers to write software applications for use with the end product.

This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of 47 CFR, Chapter I ("FCC Rules"), the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

### For Evaluation Boards annotated as FEDERAL COMMUNICATIONS COMMISSION (FCC) Part 15 Compliant

- **FCC Interference Statement for Class A Evaluation Boards:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- **FCC Interference Statement for Class B Evaluation Boards:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
  - Consult the dealer or an experienced radio/TV technician for help.
- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### WARRANTY

ST WARRANTS THAT IT HAS THE RIGHT TO PROVIDE THE EVALUATION BOARD TO YOU. THIS WARRANTY IS PROVIDED BY ST IN LIEU OF ALL OTHER WARRANTIES, WRITTEN OR ORAL, STATUTORY, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY AS TO MERCHANTABILITY, NON-INFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, OR UNINTERRUPTED OR ERROR-FREE OPERATION, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. THE EVALUATION BOARD IS PROVIDED "AS IS".



YOU WARRANT TO ST THAT YOU WILL ENSURE THE EVALUATION BOARD IS USED ONLY BY ELECTRONICS EXPERTS WHO UNDERSTAND THE DANGERS OF HANDLING AND USING SUCH ITEMS, YOU ASSUME ALL RESPONSIBILITY AND LIABILITY FOR ANY IMPROPER OR UNSAFE HANDLING OR USE OF THE EVALUATION BOARD BY YOU, YOUR EMPLOYEES, AFFILIATES, CONTRACTORS, AND DESIGNEES.

#### **LIMITATION OF LIABILITIES**

IN NO EVENT SHALL ST BE LIABLE TO YOU, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, OR ANY OTHER LEGAL THEORY, FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, INCIDENTAL, PUNITIVE, OR EXEMPLARY DAMAGES WITH RESPECT TO ANY MATTERS RELATING TO THIS AGREEMENT, REGARDLESS OF WHETHER ST HAS BEEN ADVISED OF THE POSSIBILITY OF THE SAME. IN NO EVENT SHALL ST'S LIABILITY ARISING OUT OF THIS AGREEMENT IN THE AGGREGATE EXCEED THE AMOUNT PAID BY YOU UNDER THIS AGREEMENT FOR THE PURCHASE OF THE EVALUATION BOARD, OR TEN UNITED STATES DOLLARS (\$10.00) IF NO PURCHASE PRICE WAS PAID.

#### **INDEMNIFICATION**

You shall, at Your expense, defend ST and its Affiliates against a claim or action brought by a third party for infringement or misappropriation of any patent, copyright, trade secret or other intellectual property right of a third party to the extent resulting from (1) Your combination of the Evaluation Board with any other component, system, software, or firmware, (2) Your modification of the Evaluation Board, or (3) Your use of the Evaluation Board in a manner not permitted under this Agreement.

You shall indemnify ST and its Affiliates against and pay any resulting costs and damages finally awarded against ST or its Affiliates or agreed to in any settlement, provided that You have sole control of the defense and settlement of the claim or action, and ST cooperates in the defense and furnishes all related evidence under its control at Your expense. ST will be entitled to participate in the defense of such claim or action and to employ counsel at its own expense.

"Affiliates" means any corporation or other entity directly or indirectly controlled by, controlling or under common control with the entity in question, for so long as such ownership exists. "Control" means the direct or indirect beneficial ownership of more than fifty (50%) percent of the stock or other equity interests entitled to vote for the election of directors or an equivalent governing body. Any such corporation or other legal entity shall be deemed to be an Affiliate of such Party only as long as such Control exists.

#### **TERMINATION**

ST may terminate this Agreement without notice if You breach this Agreement. Upon termination, You shall immediately destroy or return all copies of the software, firmware, and documentation of the Evaluation Board to ST and certify in writing to ST that You have done so.

#### **APPLICABLE LAW AND JURISDICTION**

This Agreement shall be governed, construed and enforced in accordance with the laws of Switzerland, without regard to its conflict of laws rules. The UN Convention on Contracts for the International Sale of Goods shall not apply to this Agreement. In case of dispute and in the absence of an amicable settlement, the only competent jurisdiction shall be the Courts of Geneva, Switzerland. Any breach of this Agreement by You may result in irreparable damage to ST for which ST will not have an adequate remedy at law. Accordingly, in addition to any other remedies and damages available, You acknowledge and agree that ST may immediately seek enforcement of this Agreement in any jurisdiction by means of specific performance or injunction, without any requirement to post a bond or other security.

#### **SEVERABILITY**

If any provision of this agreement is or becomes, at any time or for any reason, unenforceable or invalid, no other provision of this agreement shall be affected thereby, and the remaining provisions of this agreement shall continue with the same force and effect as if such unenforceable or invalid provisions had not been inserted in this Agreement. In addition, any unenforceable or invalid provision shall be deemed replaced by a provision that is valid and enforceable and that comes closest to expressing the intention of the unenforceable or invalid provision.

#### **WAIVER**

The waiver by either party of any breach of any provision of this Agreement shall not operate or be construed as a waiver of any other or a subsequent breach of the same or a different provision.

#### RELATIONSHIP OF THE PARTIES

Nothing in this Agreement shall create, or be deemed to create, any joint venture, partnership, principal-agent, employer-employee or other relationship between the Parties, except that of independent contractors. Neither Party has the authority or power to bind, to contract in the name of, or to create a liability for the other in any way or for any purpose.

#### SURVIVAL

Any provision of this Agreement which imposes an obligation after termination of this Agreement shall survive the termination of this Agreement.

#### SECTION HEADINGS

Section headings are inserted for convenience only and shall not be used to interpret this Agreement.

#### WASTE AND RECYCLING

**The Evaluation Board is not to be disposed of as urban waste. At the end of its life cycle, differentiated waste collection must be followed.** Consult the local authorities for more information on the proper disposal channels. It is mandatory to separately collect the Evaluation Board and make sure it is delivered it to the appropriate waste management and recycling centers.

As of 15 August 2018, in all the countries belonging to the European Union, the Evaluation Board is subject to the WEEE Directive 2012/19/EU requirement; therefore, it is forbidden to dispose of the Evaluation Board as undifferentiated waste or with other domestic wastes. Consult the local authorities for more information on the proper recycling centers.

Disposing of the Evaluation Board incorrectly may cause damage to the environment and may be subject to fines based on specific countries' rules.

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

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