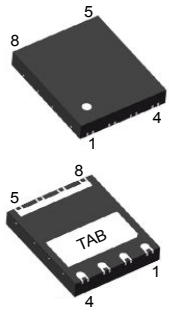
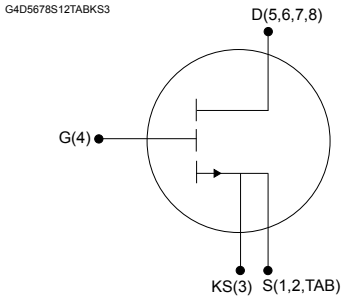
SGT100R70FDC

Datasheet

700 V, 74 mΩ typ., 21 A, e-mode PowerGaN transistor



PowerFLAT 5x6 HV for PowerGaN



Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D	Series
SGT100R70FDC	700 V	100 mΩ	21 A	G-HEMT

- Enhancement mode normally off transistor
- Very high switching speed
- High power management capability
- Extremely low capacitances
- Zero reverse recovery charge
- ESD safeguard

Applications

- AC-DC converters
- DC-DC converters
- USB type-C PD adapters and quick chargers
- Wireless charging

Description

The SGT100R70FDC is a 700 V, 21 A e-mode PowerGaN transistor. The resulting device provides extremely low conduction losses, high current capability and ultra-fast switching operation to enable high power density and unbeatable efficiency performances.

Product status link
SGT100R70FDC

Product summary	
Order code	SGT100R70FDC
Marking	100R70F
Package	PowerFLAT 5x6 HV for PowerGaN
Packing	Tape and reel

1 Electrical ratings

T_C = 25 °C unless otherwise specified.

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	700(1)	V
	Drain-source voltage (transient, t_p < 200 µs)	800	
V_{GS}	Gate-source voltage	-6 to 7	V
I_D	Drain current (continuous)	21	A
I_{DM}	Pulse drain current (t_p = 10 µs)	41	A
P_{TOT}	Total power dissipation at T_C = 25 °C	107	W
T_{stg}	Storage temperature range	-55 to 150	°C
T_J	Operating junction temperature range		°C

1. *Recommended continuous maximum bus voltage during switching operations should not exceed 450 V.*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	1.16	°C/W
R_{thJA}(1)	Thermal resistance, junction-to-ambient	69.94	°C/W

1. *When mounted on a standard 1 inch² area of FR-4 PCB with 2-oz copper.*

2 Electrical characteristics

T_C = 25 °C unless otherwise specified.

Table 3. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{DSS}	Drain-source leakage current	V_{GS} = 0 V, V_{DS} = 700 V		0.8		µA
		V_{GS} = 0 V, V_{DS} = 700 V, T_J = 125 °C		9		
I_{GSS}	Gate-source leakage current	V_{DS} = 0 V, V_{GS} = 6 V		90		µA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 18.3 mA	1.2	1.7	2.5	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 6 V, I_D = 0.5 A		74	100	mΩ
		V_{GS} = 6 V, I_D = 6 A, T_J = 125 °C		148		

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{GS} = 0 V, V_{DS} = 400 V, f = 100 kHz	-	133	-	pF
C_{oss}	Output capacitance		-	45	-	pF
C_{rss}	Reverse transfer capacitance		-	1	-	pF
$C_{o(er)}$[1]	Equivalent output capacitance energy related	V_{GS} = 0 V, V_{DS} = 0 to 400 V	-	67	-	pF
$C_{o(tr)}$[2]	Equivalent output capacitance time related		-	81	-	pF
R_g	Intrinsic gate resistance	f = 5 MHz, I_D = 0 A	-	6	-	Ω
V_{plat}	Gate plateau voltage	V_{DS} = 400 V, I_D = 6 A	-	2.7	-	V
Q_g	Total gate charge	V_{GS} = 0 to 6 V, V_{DS} = 400 V, I_D = 6 A	-	2.8	-	nC
Q_{gs}	Gate-source charge		-	0.85	-	nC
Q_{gd}	Gate-drain charge		-	0.85	-	nC
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V, V_{DS} = 400 V	-	0	-	nC
Q_{oss}	Output charge		-	35.9	-	nC

1. *$C_{o(er)}$ is a constant capacitance value that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to the stated value.*
2. *$C_{o(tr)}$ is a constant capacitance value that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to the stated value.*

Table 5. Reverse conduction

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD}	Source-drain reverse voltage	V_{GS} = 0 V, I_{SD} = 6 A	-	2.4	-	V

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DS} = 400 V, I_D = 6 A, V_{GS} = 6 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 2 Ω, L = 170 µH	-	6.5	-	ns
t_r	Rise time		-	4.7	-	ns
$t_{d(off)}$	Turn-off delay time		-	5.3	-	ns
t_f	Fall time		-	6.2	-	ns

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area (T_C = 25 °C)

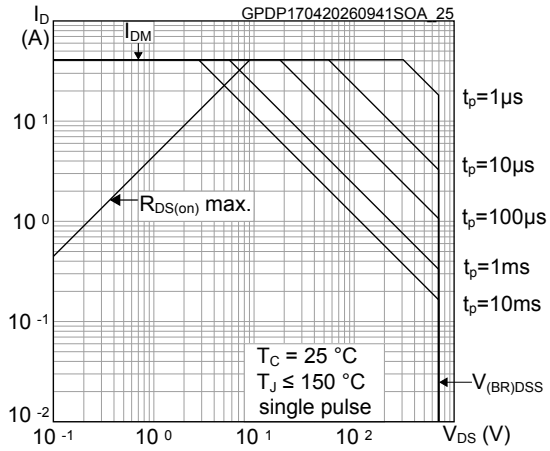


Figure 2. Safe operating area (T_C = 125 °C)

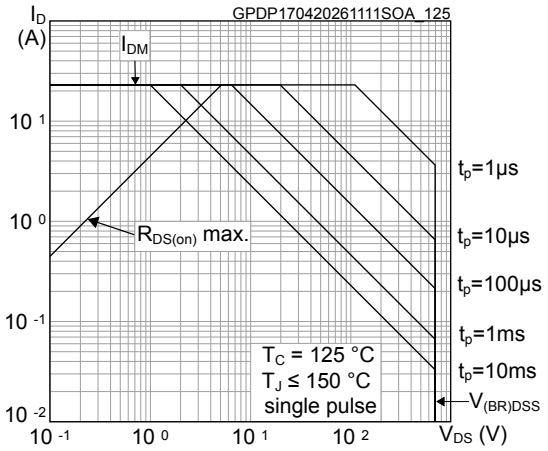


Figure 3. Maximum transient thermal impedance

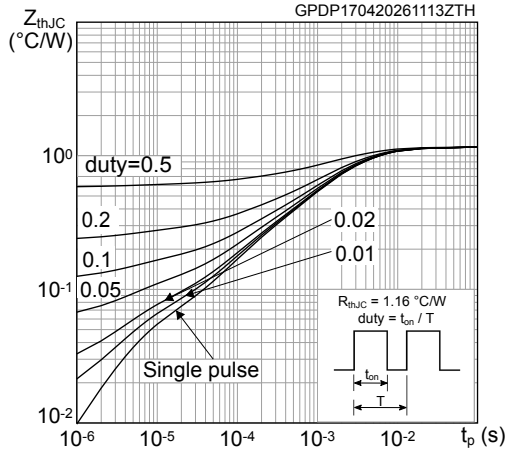


Figure 4. Total power dissipation

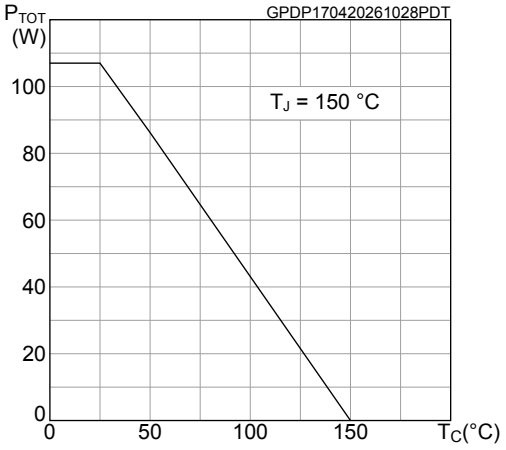


Figure 5. Typical output characteristics (T_J = 25 °C)

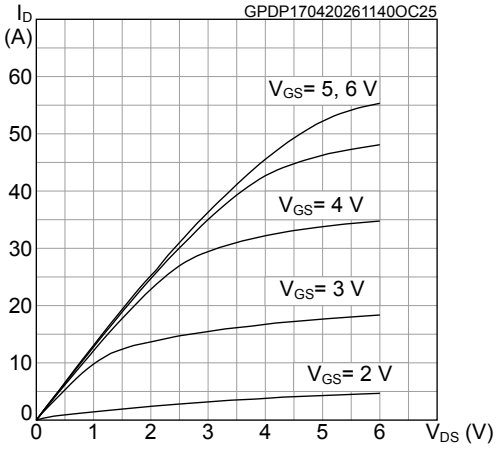


Figure 6. Typical output characteristics (T_J = 125 °C)

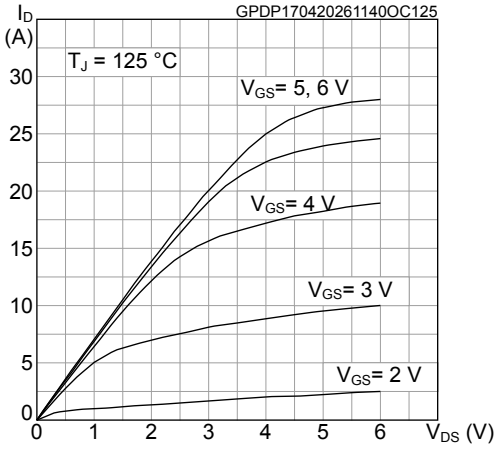


Figure 7. Typical transfer characteristics

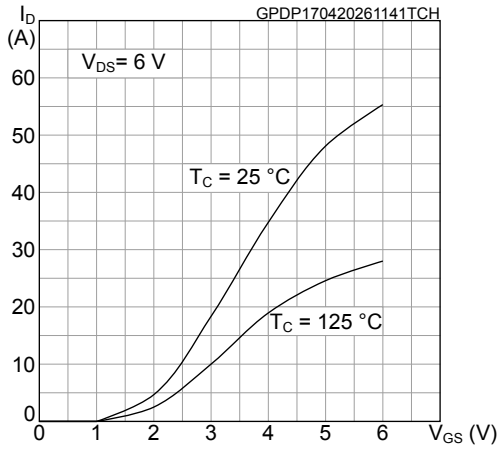


Figure 8. Normalized on-resistance vs temperature

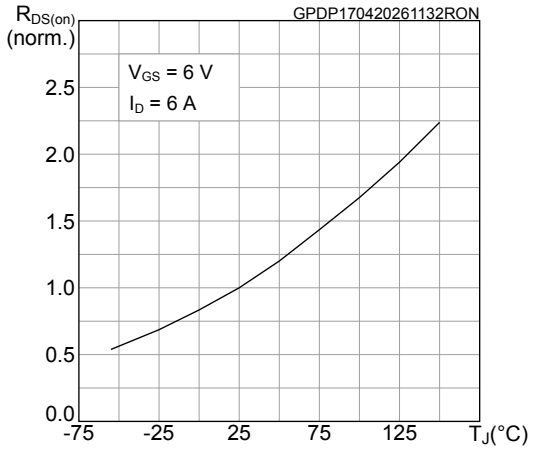


Figure 9. Typical drain-source on-resistance (T_J = 25 °C)

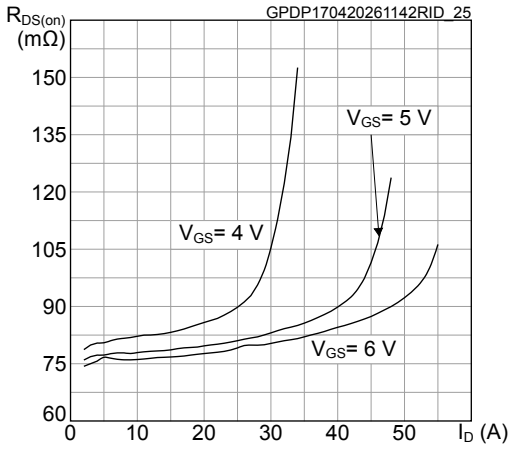


Figure 10. Typical drain-source on-resistance (T_J = 125 °C)

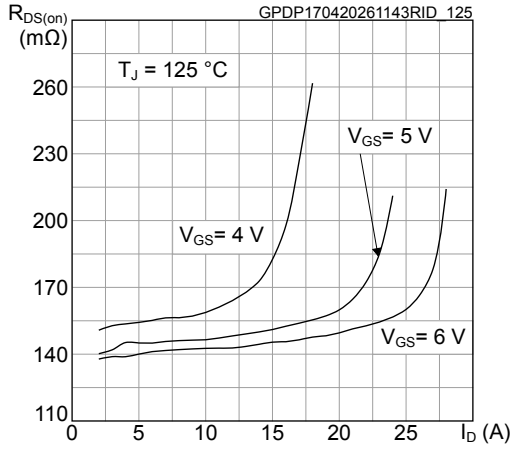


Figure 11. Typical gate charge characteristics

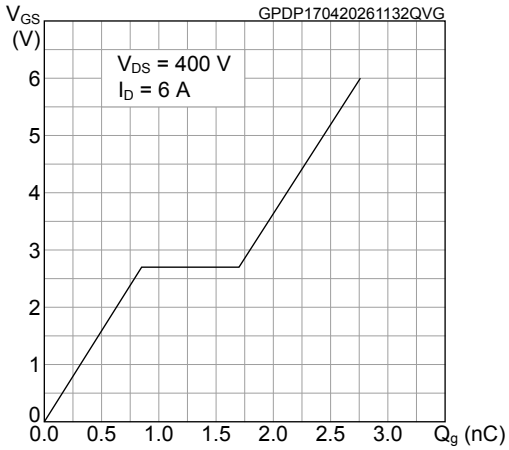


Figure 12. Typical capacitance characteristics

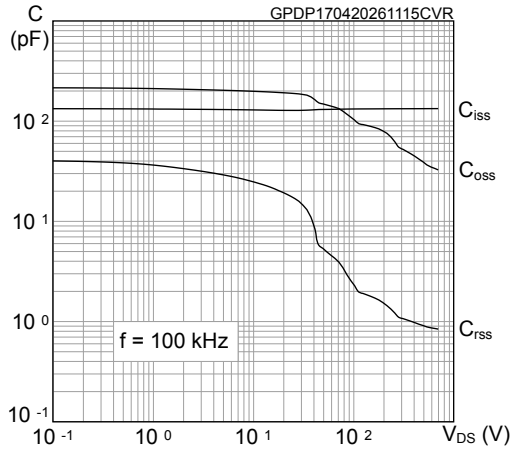


Figure 13. Typical output capacitance charge

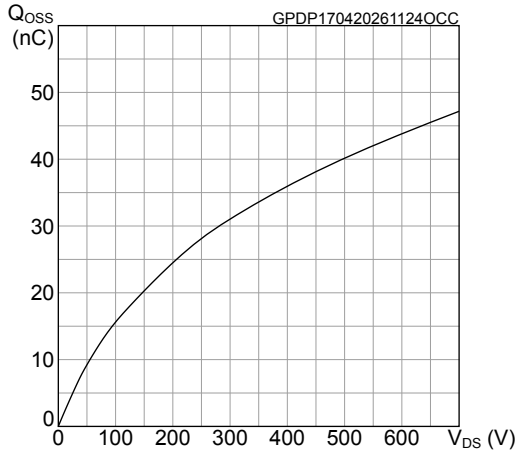


Figure 14. Typical output capacitance stored energy

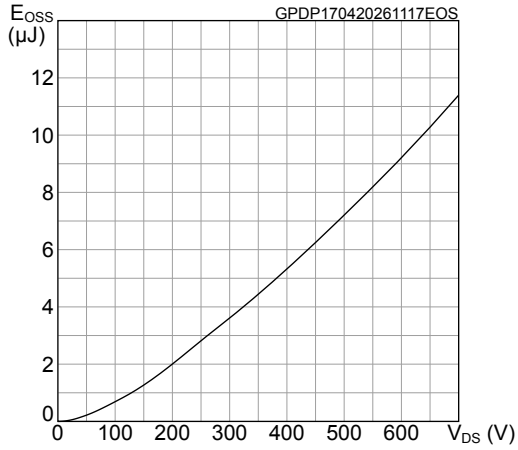


Figure 15. Typical diode reverse conduction characteristics (T_J = 25 °C)

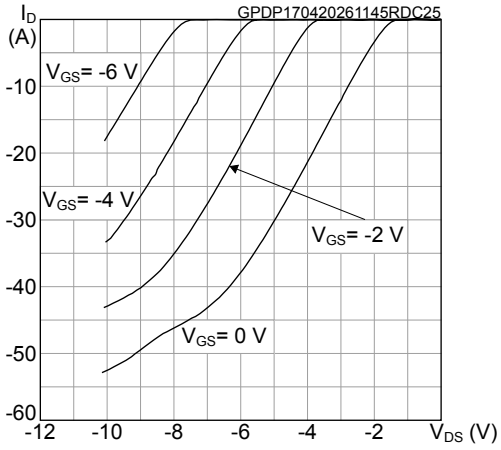


Figure 16. Typical diode reverse conduction characteristics (T_J = 125 °C)

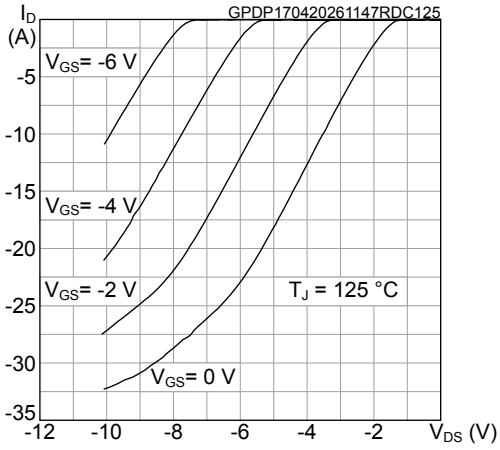


Figure 17. Typical reverse conduction characteristics (T_J = 25 °C)

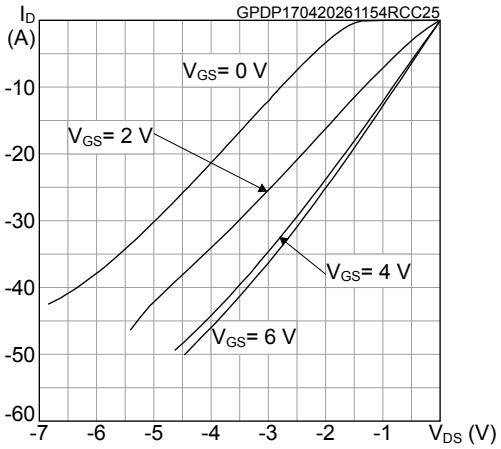


Figure 18. Typical reverse conduction characteristics (T_J = 125 °C)

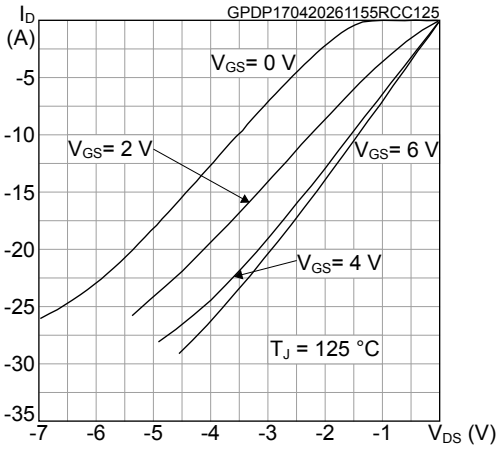
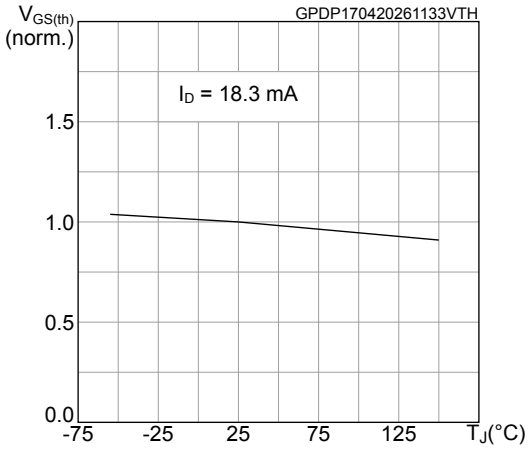


Figure 19. Normalized gate threshold vs temperature



3 Test circuits

Figure 20. Test circuit for inductive load switching times

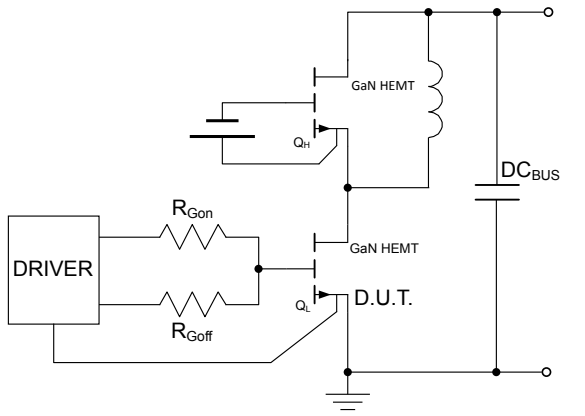
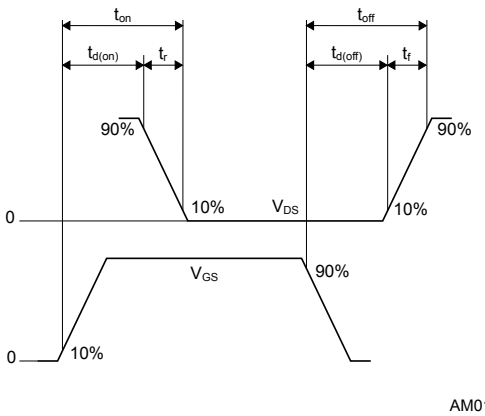


Figure 21. Switching time waveforms

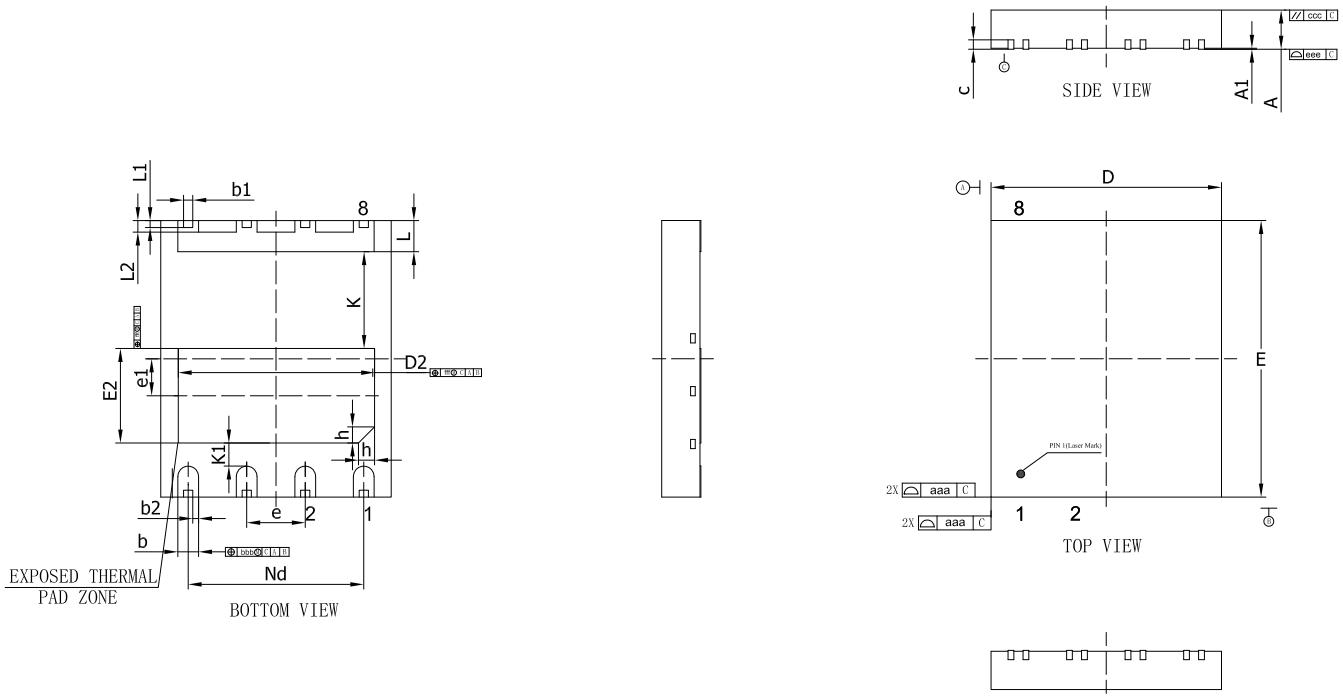


4 Package information

To meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions, and product status are available at: www.st.com. ECOPACK is an ST trademark.

4.1 PowerFLAT 5x6 HV for PowerGaN package information

Figure 22. PowerFLAT 5x6 HV for PowerGaN package outline



DM01190469_PowerFLAT_5x6_HV_for_GaN_2

Table 7. **PowerFLAT 5x6 HV for PowerGaN mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	0.80	0.85	0.90
A1	0.00	0.02	0.05
b	0.40	0.45	0.50
b1		0.20REF	
b2		0.125REF	
c		0.203REF	
D	4.90	5.00	5.10
D2	4.16	4.26	4.36
e		1.27BSC	
e1		0.80BSC	
Nd		3.81BSC	
E	5.90	6.00	6.10
E2	1.95	2.05	2.15
L	0.625	0.675	0.725
L1		0.15REF	
L2		0.25REF	
h	0.30	0.35	0.40
K		2.10REF	
K1		0.50REF	
aaa		0.10	
bbb		0.07	
ccc		0.10	
eee		0.08	
fff		0.10	

Figure 23. **PowerFLAT 5x6 HV for PowerGaN recommended footprint (dimensions are in mm)**

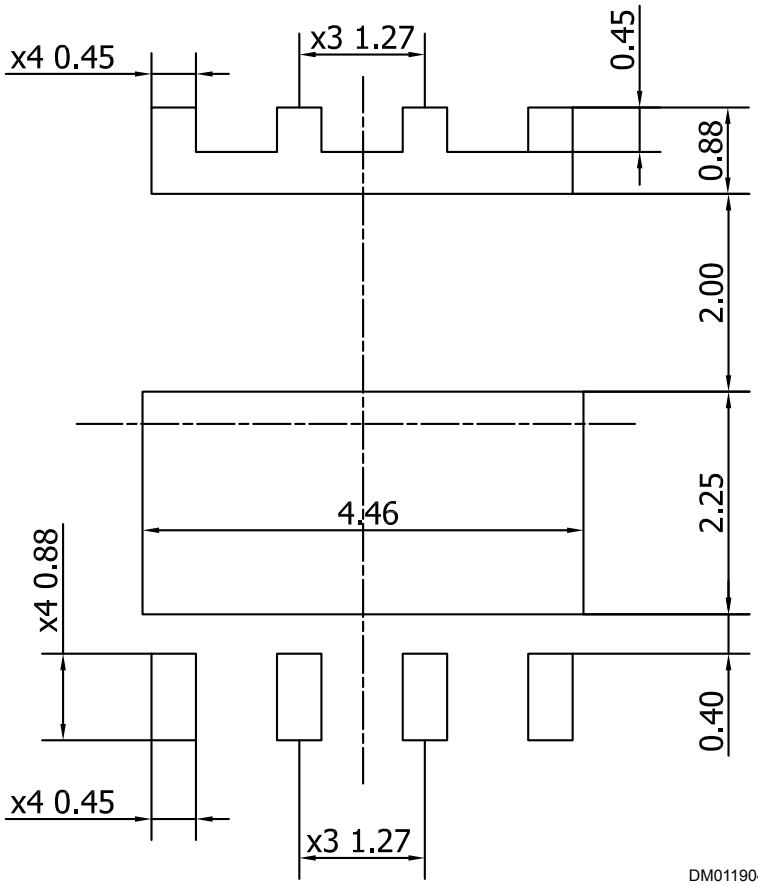
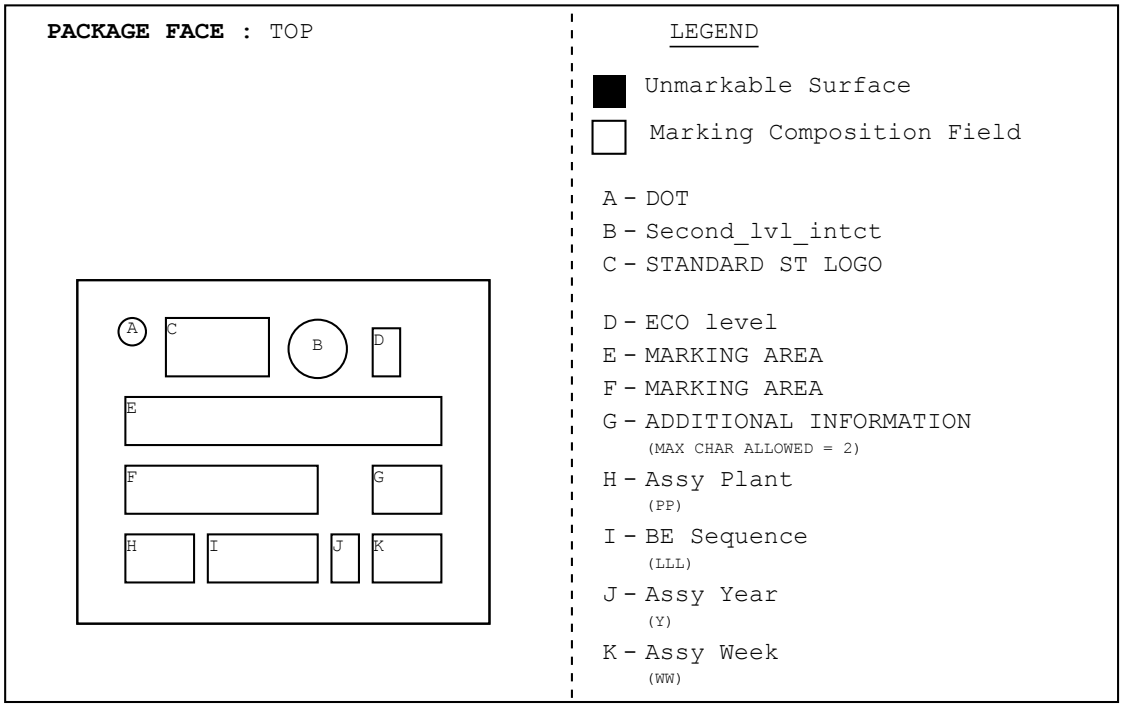


Figure 24. **Marking composition for PowerFLAT 5x6 HV for PowerGaN**



DM01207361_rev.3

Engineering samples

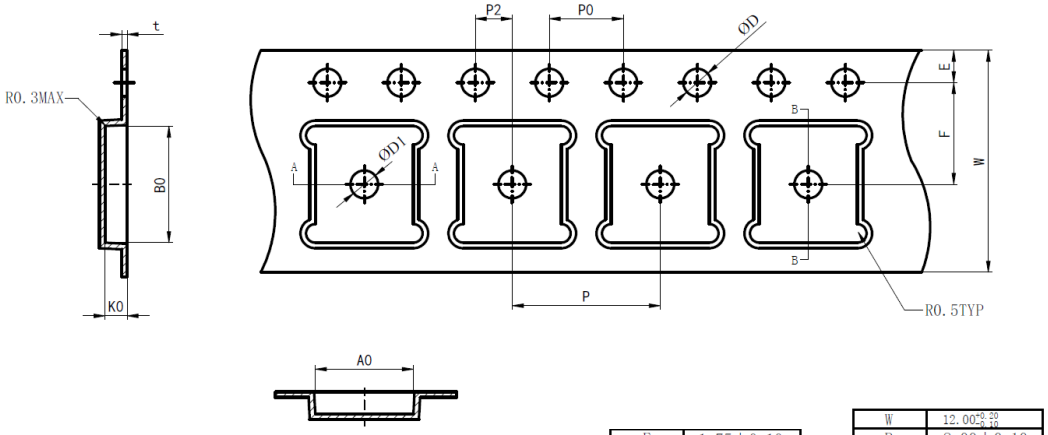
These samples are clearly identified by “ES” digits in the marking additional information field of each unit. These samples are intended to be used for electrical compatibility evaluation only; usage for any other purpose may be agreed only upon written authorization by ST. ST is not liable for any customer usage in production and/or in reliability qualification trials.

Commercial samples

Fully qualified parts from ST standard production with no limitations of use or special identification marking.

4.2 PowerFLAT 5x6 HV for PowerGaN packing information

Figure 25. **PowerFLAT 5x6 HV for PowerGaN tape (dimensions are in mm)**

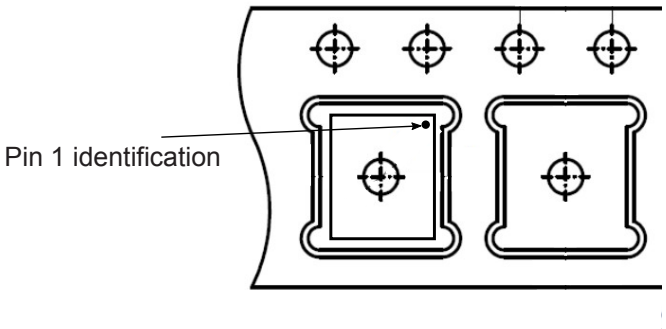


E	1. 75±0. 10
F	5. 50±0. 05
P2	2. 00±0. 05
D	1. 50 +0. 10 0
D1	1. 50MIN
P0	4. 00±0. 10
10P0	40. 0±0. 20

W	12. 00 +0. 30 −0. 10
P	8. 00±0. 10
A0	5. 30±0. 10
B0	6. 30±0. 10
K0	1. 20±0. 10
t	0. 30±0. 05

Tape_PowerFLAT5x6_HV_GaN

Figure 26. **PowerFLAT 5x6 HV for PowerGaN package orientation in carrier tape**



Revision history

Table 8. **Document revision history**

Date	Revision	Changes
06-May-2026	1	First release.

Contents

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