



45V 4.5A QUAD POWER HALF BRIDGE

PRODUCT PREVIEW

1 FEATURES

- MULTIPOWER BCD TECHNOLOGY
- MINIMUM INPUT OUTPUT PULSE WIDTH DISTORTION
- 200m Ω R_{dsON} COMPLEMENTARY DMOS OUTPUT STAGE
- CMOS COMPATIBLE LOGIC INPUTS
- THERMAL PROTECTION
- THERMAL WARNING OUTPUT
- UNDER VOLTAGE PROTECTION
- SHORT CIRCUIT PROTECTION

2 DESCRIPTION

STA508 is a monolithic quad half bridge stage in Multipower BCD Technology. The device can be used as dual bridge or reconfigured, by connecting CONFIG pin to V_{dd} pin, as single bridge with double current

Figure 1. Package



Table 1. Order Codes

Part Number	Package
STA508A	PowerSO36

capability, and as half bridge (BTL mode) with half current capability. The device is particularly designed to make the output stage of a stereo All-Digital High Efficiency (DDX™) amplifier capable to deliver 80 + 80W @ THD = 10% at V_{CC} 36V output power on 8 Ω load. In single BTL configuration is also capable to deliver a peak of 160W @ THD = 10% at V_{CC} = 36V on 4 Ω load. The input pins have threshold proportional to V_{DD} pin voltage.

Figure 2. Audio Application Circuit (Dual BTL)

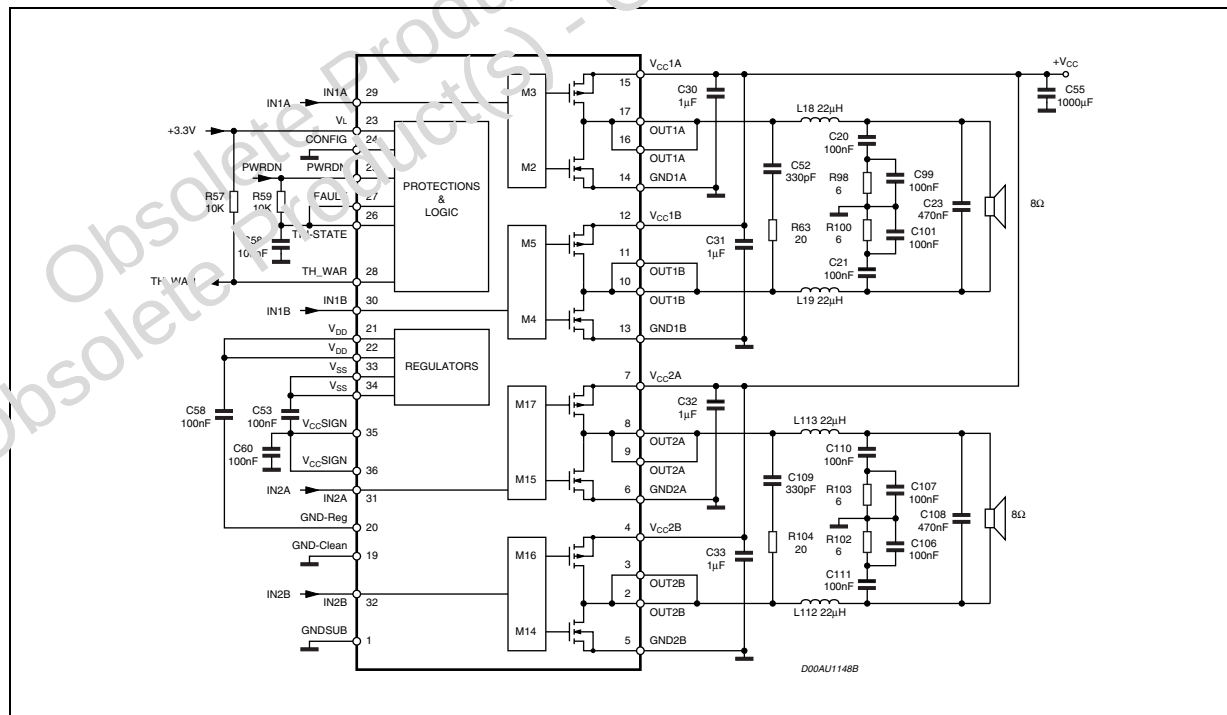


Table 2. Pin Function

N°	Pin	Description
1	GND-SUB	Substrate Ground
2 ; 3	OUT2B	Output Half Bridge 2B
4	V _{CC} 2B	Positive Supply
5	GND2B	Negative Supply
6	GND2A	Negative Supply
7	V _{CC} 2A	Positive Supply
8 ; 9	OUT2A	Output Half Bridge 2A
10 ; 11	OUT1B	Output Half Bridge 1B
12	V _{CC} 1B	Positive Supply
13	GND1B	Negative Supply
14	GND1A	Negative Supply
15	V _{CC} 1A	Positive Supply
16 ; 17	OUT1A	Output Half Bridge 1A
18	NC	Not Connected
19	GND-clean	Logical Ground
20	GND-Reg	Ground for Regulator V _{dd}
21 ; 22	V _{dd}	5V Regulator Referred to Ground
23	V _L	High Logical State Setting Voltage
24	CONFIG	Configuration pin
25	PWRDN	Stand-by pin
26	TRI-STATE	Hi-Z pin
27	FAULT	Fault pin Advisor
28	TH-WAR	Thermal Warning Advisor
29	IN1A	Input of Half Bridge 1A
30	IN1B	Input of Half Bridge 1B
31	IN2A	Input of Half Bridge 2A
32	IN2B	Input of Half Bridge 2B
33 ; 34	V _{SS}	5V Regulator Referred to +V _{CC}
35 ; 36	V _{CC} Sign	Signal Positive Supply

Table 3. Functional Pin Status

PIN NAME	Logical value	IC -STATUS
FAULT	0	Fault detected (Short circuit, or Thermal ..)
FAULT (*)	1	Normal Operation
TRI-STATE	0	All powers in Hi-Z state
TRI-STATE	1	Normal operation
PWRDN	0	Low absorption
PWRDN	1	Normal operation
THWAR	0	Temperature of the IC =130°C
THWAR(*)	1	Normal operation
CONFIG	0	Normal Operation
CONFIG(**)	1	OUT1A = OUT1B ; OUT2A=OUT2B (IF IN1A = IN1B; IN2A = IN2B)

(*) : The pin is open collector. To have the high logic value, it needs to be pulled up by a resistor.

(**): To put CONFIG = 1 means connect Pin 24 (CONFIG) to Pins 21, 22 (Vdd)

Table 4. Pin Connection

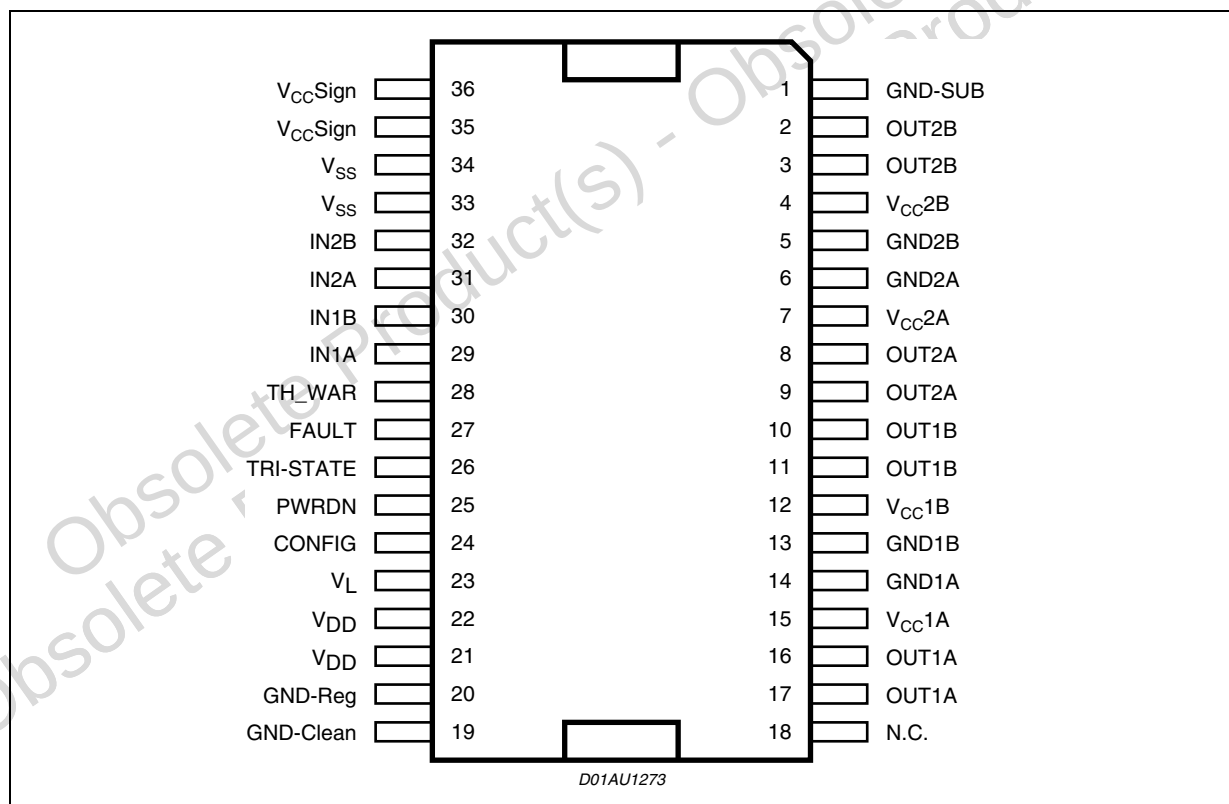


Table 5. Thermal Data

Symbol	Description	Value	Unit
R _{th j-case}	Thermal Resistance Junction-case	max 1.5	°C/W

Table 6. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Pin 4,7,12,15)	45	V
V_{max}	Maximum Voltage on pins 23 to 32	5.5	V
P_{tot}	Power Dissipation ($T_{case} = 70^{\circ}C$)	50	W
T_{op}	Operating Temperature Range	0 to 70	$^{\circ}C$
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	$^{\circ}C$

Table 7. Electrical Characteristics ($V_L = 3.3V$; $V_{CC} = 30V$; $T_{amb} = 25^{\circ}C$; $f_{sw} = 384KHz$; unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
R_{dsON}	Power Pchannel/Nchannel MOSFET RdsON	$I_d = 1A$		200	270	$m\Omega$
I_{dss}	Power Pchannel/Nchannel leakage I_{dss}	$V_{CC} = 35V$			50	μA
g_N	Power Pchannel RdsON Matching	$I_d = 1A$	95			%
g_P	Power Nchannel RdsON Matching	$I_d = 1A$	95			%
Dt_s	Low current Dead Time (static)	see test circuit no.1; see fig. 4		10	20	ns
Dt_d	High current Dead Time (dinamic)	$L = 22\mu H$; $C = 470nF$; $R_L = 8\Omega$ $I_d = 3.5A$; see fig. 3			50	ns
t_{dON}	Turn-on delay time	Resistive load			100	ns
t_{dOFF}	Turn-off delay time	Resistive load			100	ns
t_r	Rise time	Resistive load; as fig.4			25	ns
t_f	Fall time	Resistive load; as fig. 4			25	ns
V_{CC}	Supply voltage operating voltage		10		40	V
V_{IN-H}	High level input voltage				$V_L/2 + 300mV$	V
V_{IN-L}	Low level input voltage		$V_L/2 - 300mV$			V
I_{IN-H}	Hi level Input current	Pin Voltage = V_L		1		μA
I_{IN-L}	Low level input current	Pin Voltage = 0.3V		1		μA
$I_{PWRDN-H}$	High level PWRDN pin input current	$V_L = 3.3V$		35		μA
V_{Low}	Low logical state voltage V_L (pin PWRDN, TRISTATE) (note 1)	$V_L = 3.3V$	0.8			V

Table 7, (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V _{High}	High logical state voltage V _H (pin PWRDN, TRISTATE) (note 1)	V _L = 3.3V			1.7	V
I _{VCC-PWRDN}	Supply CURRENT from V _{CC} in Power Down	PWRDN = 0			3	mA
I _{FAULT}	Output Current pins FAULT -TH-WARN when FAULT CONDITIONS	V _{pin} = 3.3V		1		mA
I _{VCC-hiz}	Supply Current from V _{CC} in Tri-state	V _{CC} = 30V; Tri-state = 0		22		mA
I _{VCC}	Supply Current from V _{CC} in operation both channel switching)	V _{CC} = 30V; Input Pulse width = 50% Duty; Switching Frequency = 384KHz; No LC filters;		50		mA
I _{VCC-q}	I _{sc} (short circuit current limit) (note 2)		4.5	6	9	A
V _{UV}	Undervoltage protection threshold			7		V
t _{pw-min}	Output minimum pulse width	No Load	70		150	ns

Table 8.

Notes: 1. The following table explains the V_{Low}, V_{High} variation with V_L

V _L	V _{Lmin}	V _{Hmax}	Unit
2.7	0.7	1.5	V
3.3	0.8	1.7	V
5	0.85	1.85	V

Note 2: See relevant Application Note AN1994

Table 9. Logic Truth Table (see fig. 5)

TRI-STATE	INxA	INxB	Q1	Q2	Q3	Q4	OUTPUT MODE
0	x	x	OFF	OFF	OFF	OFF	Hi-Z
1	0	0	OFF	OFF	ON	ON	DUMP
1	0	1	OFF	ON	ON	OFF	NEGATIVE
1	1	0	ON	OFF	OFF	ON	POSITIVE
1	1	1	ON	ON	OFF	OFF	Not used

Figure 3. Test Circuit.

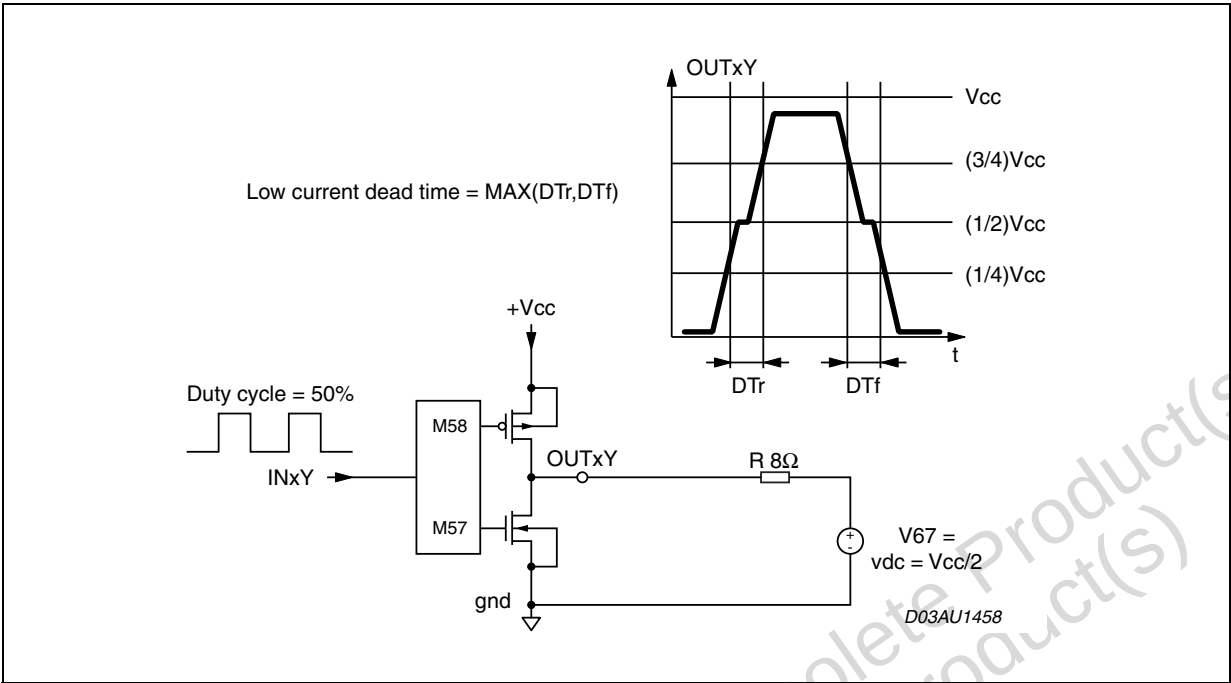


Figure 4.

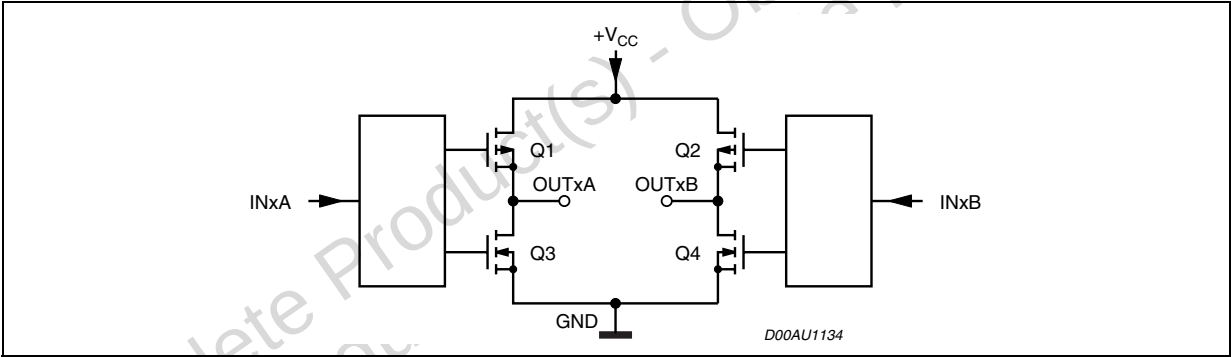


Figure 5.

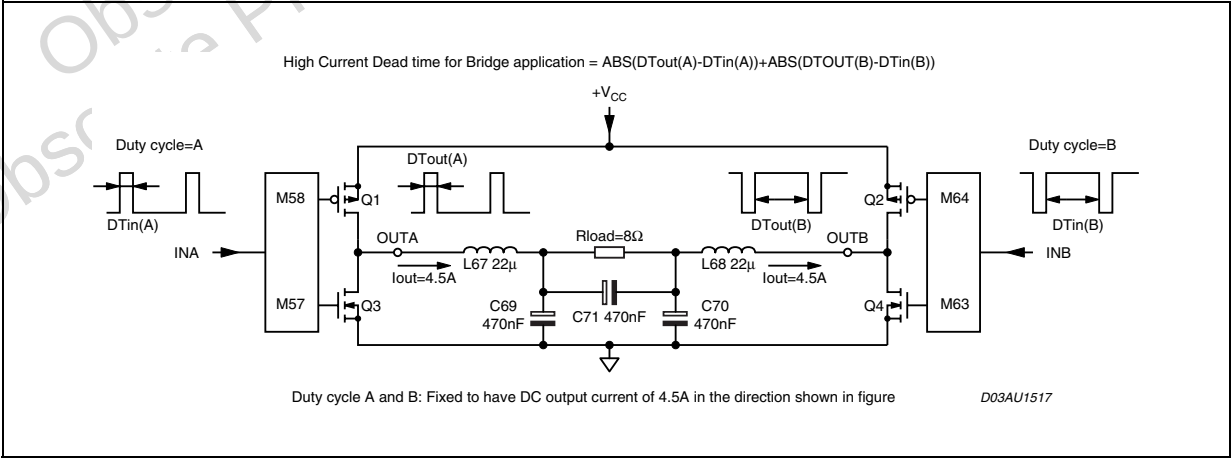


Figure 6. Typical Single BTL Configuration

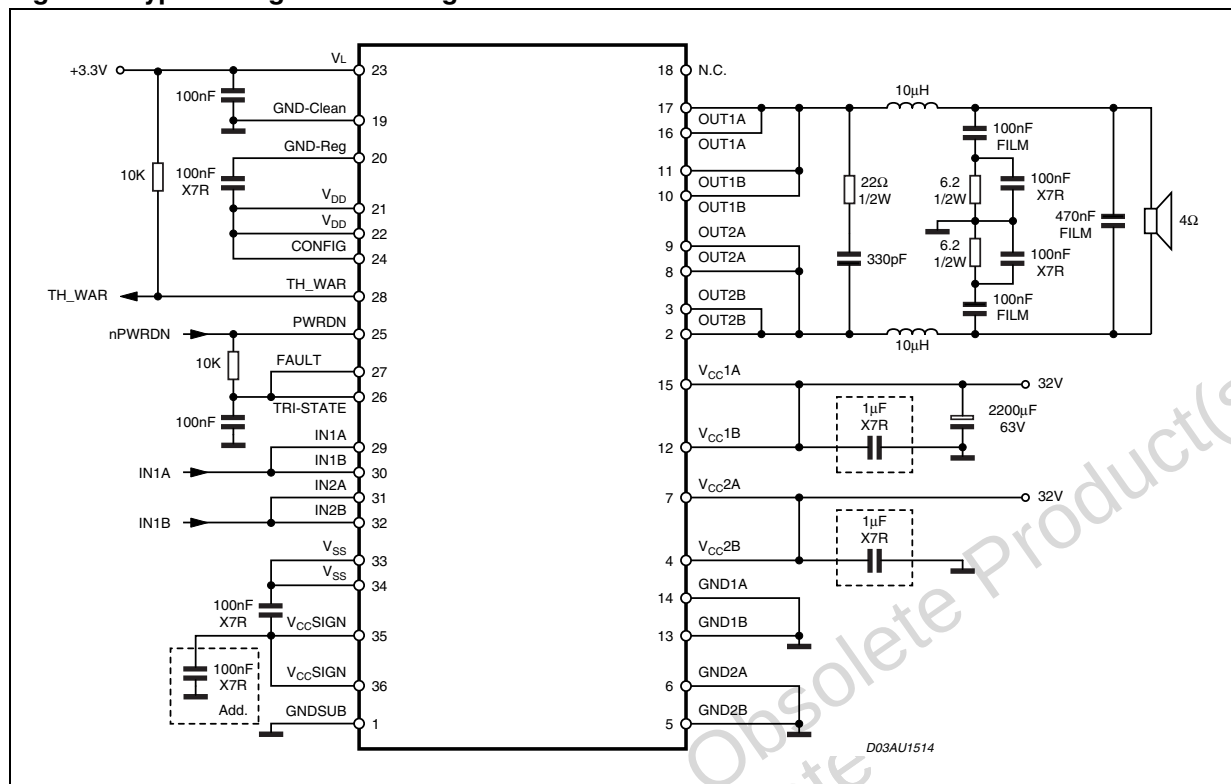
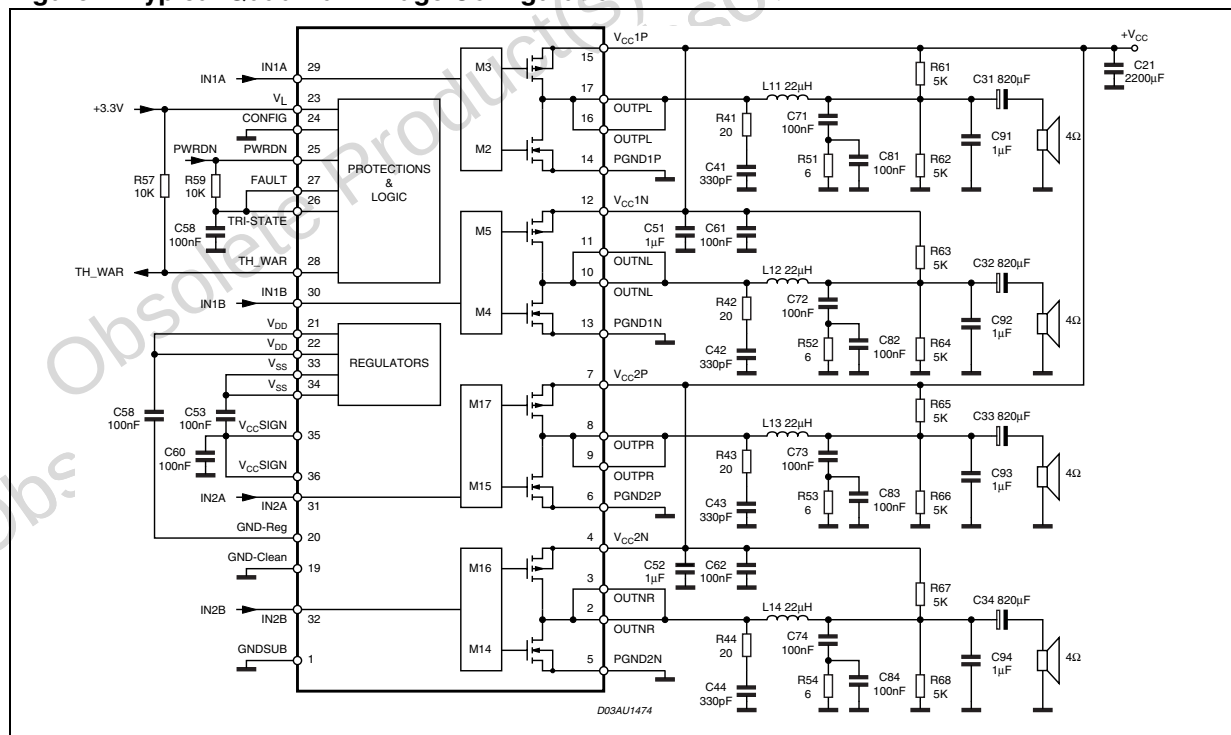


Figure 7. Typical Quad Half Bridge Configuration



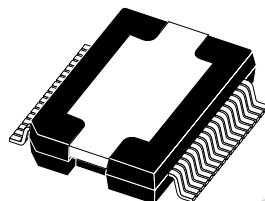
For more information refer to the application notes AN1456 and AN1661

Figure 8. PowerSO36 Mechanical Data & Package Dimensions

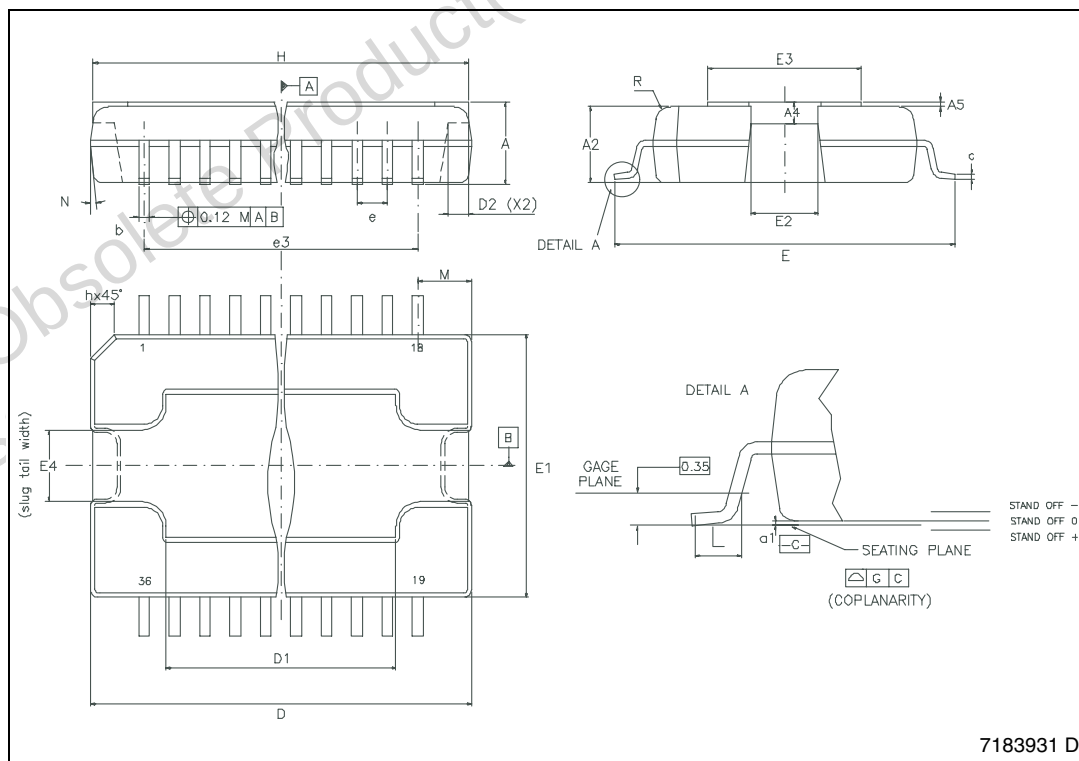
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	3.25		3.43	0.128		0.135
A2	3.1		3.2	0.122		0.126
A4	0.8		1	0.031		0.039
A5		0.2			0.008	
a1	0.030		-0.040	0.0011		-0.0015
b	0.22		0.38	0.008		0.015
c	0.23		0.32	0.009		0.012
D	15.8		16	0.622		0.630
D1	9.4		9.8	0.37		0.38
D2		1			0.039	
E	13.9		14.5	0.547		0.57
E1	10.9		11.1	0.429		0.437
E2			2.9			0.114
E3	5.8		6.2	0.228		0.244
E4	2.9		3.2	0.114		1.259
e		0.65			0.026	
e3		11.05			0.435	
G	0		0.075	0		0.003
H	15.5		15.9	0.61		0.625
h			1.1			0.043
L	0.8		1.1	0.031		0.043
N			10°			10°
s			8°			8°

- (1) "D and E1" do not include mold flash or protusions.
Mold flash or protusions shall not exceed 0.15mm (0.006")
(2) No intrusion allowed inwards the leads.

OUTLINE AND MECHANICAL DATA



PowerSO36 (SLUG UP)



7183931 D

Table 10. Revision History

Date	Revision	Description of Changes
August 2004	1	First Issue
November 2004	2	Changed Vcc from 9 min to 10 min

Obsolete Product(s) - Obsolete Product(s)
Obsolete Product(s) - Obsolete Product(s)

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