



## 40V 3.5A DOUBLE POWER HALF BRIDGE

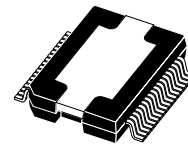
- MINIMUM INPUT OUTPUT PULSE WIDTH DISTORTION
- 200mΩ  $R_{dsON}$  COMPLEMENTARY DMOS OUTPUT STAGE
- CMOS COMPATIBLE LOGIC INPUTS
- THERMAL PROTECTION
- THERMAL WARNING OUTPUT
- UNDER VOLTAGE PROTECTION

### DESCRIPTION

STA501 is a monolithic dual half bridge stage in Multipower BCD Technology.

The device is particularly designed to make the output stage of a mono All-Digital High Efficiency

### MULTIPOWER BCD TECHNOLOGY

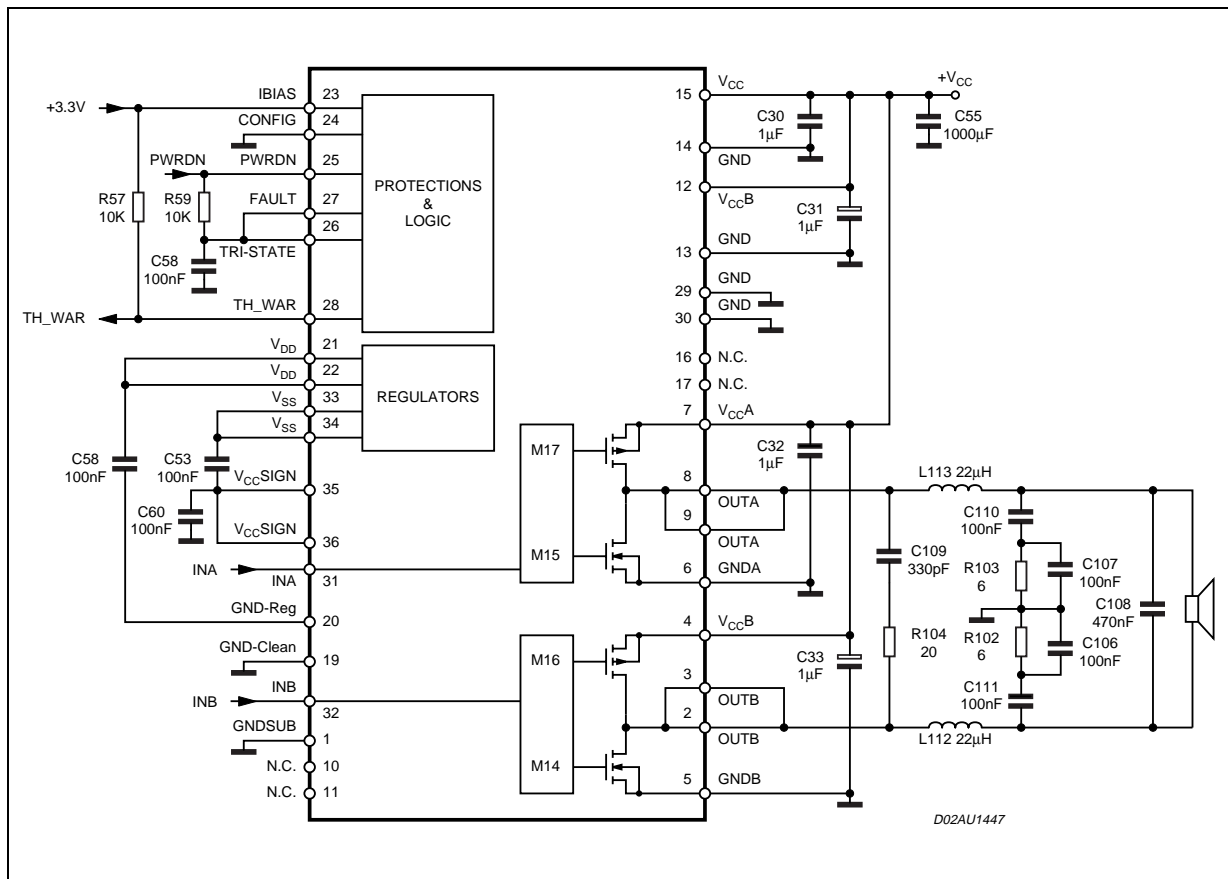


PowerSO36

ORDERING NUMBER: STA501

(DDX™) amplifier capable to deliver 50W @ THD = 10% at  $V_{CC}$  30V output power on 8Ω load. The input pins have threshold proportional to  $I_{bias}$  pin voltage.

### AUDIO APPLICATION CIRCUIT



## STA501

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### PIN FUNCTION

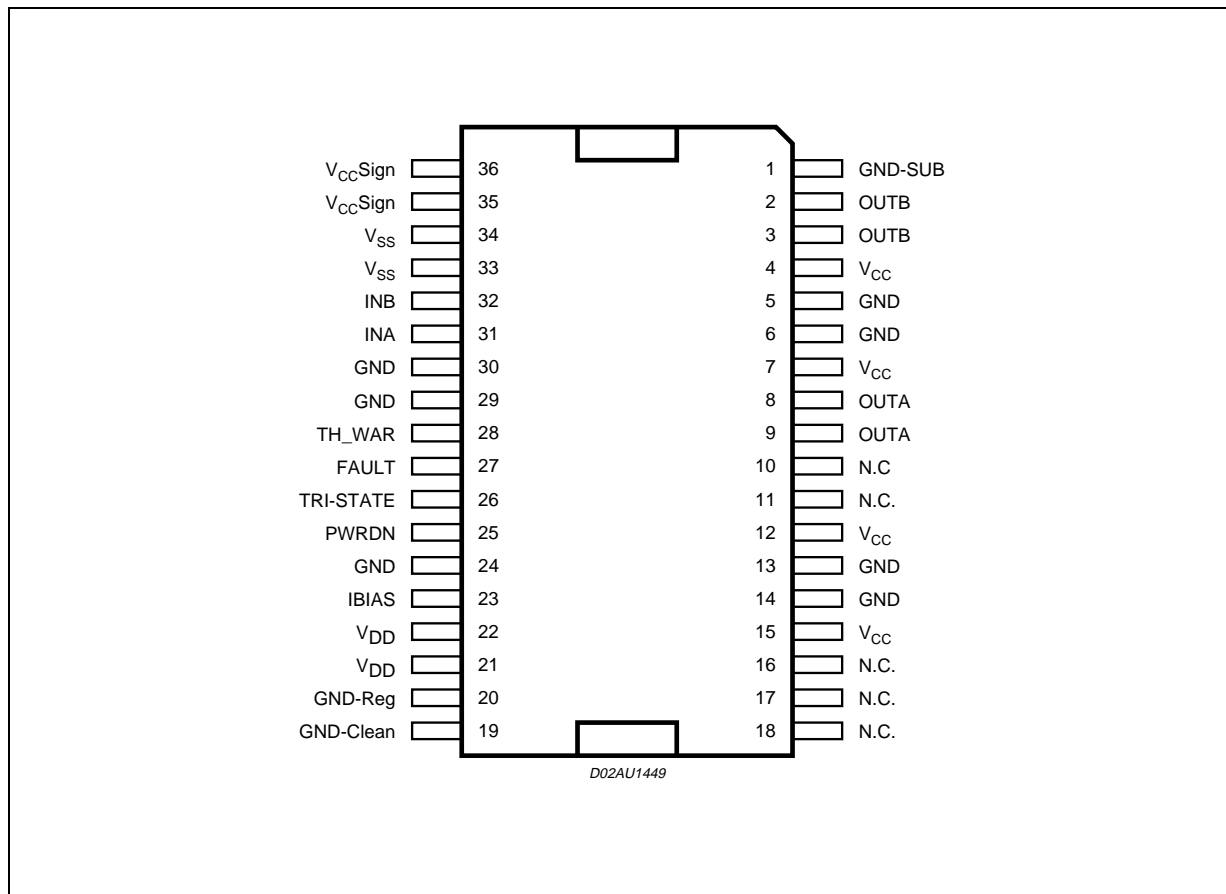
N°	Pin	Description
1	GND-SUB	Substrate ground
35 ; 36	Vcc Sign	Signal Positive Supply
15	Vcc	Positive Supply
12	Vcc	Positive Supply
7	Vcc	Positive Supply
4	Vcc	Positive Supply
14	GND	Negative Supply
13	GND	Negative Supply
6	GND	Negative Supply
5	GND	Negative Supply
16 ; 17	N.C.	
10 ; 11	N.C.	
8 ; 9	OUTA	Output half bridge
2 ; 3	OUTB	Output half bridge
29	GND	
30	GND	
31	INA	Input of half bridge
32	INB	Input of half bridge
21 ; 22	Vdd	5V Regulator referred to ground
33 ; 34	Vss	5V Regulator referred to +Vcc
25	PWRDN	Stand-by pin
26	TRI-STATE	Hi-Z pin
27	FAULT	Fault pin advisor
24	GND	
28	TH-WAR	Thermal warning advisor
19	GND-clean	Logical ground
23	IBIAS	High logical state setting voltage
18	NC	Not connected
20	GND-Reg	Ground for regulator Vdd

**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 =130C
THWAR*	1	Normal operation

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

**PIN CONNECTION**



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CE</sub>	DC Supply Voltage (Pin 4,7,12,15)	40	V
V <sub>max</sub>	Maximum Voltage on pins 23 to 32	5.5	V
T <sub>op</sub>	Operating Temperature Range	0 to 70	°C
T <sub>stg</sub> , T <sub>j</sub>	Storage and Junction Temperature	-40 to 150	°C

**THERMAL DATA**

Symbol	Parameter	Min.	Typ.	Max.	Unit
T <sub>j-case</sub>	Thermal Resistance Junction to Case (thermal pad)			2.5	°C/W
T <sub>jSD</sub>	Thermal shut-down junction temperature		150		°C
T <sub>warn</sub>	Thermal warning temperature		130		°C
t <sub>hSD</sub>	Thermal shut-down hysteresis		25		°C

**ELECTRICAL CHARACTERISTICS** (I<sub>bias</sub> = 3.3V; V<sub>cc</sub> = 30V; T<sub>amb</sub> = 25°C unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
R <sub>dsON</sub>	Power Pchannel/Nchannel MOSFET RdsON	I <sub>d</sub> =1A		200	270	mΩ
I <sub>dss</sub>	Power Pchannel/Nchannel leakage I <sub>dss</sub>	V <sub>cc</sub> =35V			50	μA
g <sub>N</sub>	Power Pchannel RdsON Matching	I <sub>d</sub> =1A	95			%
g <sub>P</sub>	Power Nchannel RdsON Matching	I <sub>d</sub> =1A	95			%
Dt <sub>s</sub>	Low current Dead Time (static)	see test circuit no.1; see fig. 1		10	20	ns
Dt <sub>d</sub>	High current Dead Time (dynamic)	L=22μH; C = 470nF; R <sub>I</sub> = 8 Ω I <sub>d</sub> =3.5A; see fig. 3			50	ns
t <sub>d ON</sub>	Turn-on delay time	Resistive load			100	ns
t <sub>d OFF</sub>	Turn-off delay time	Resistive load			100	ns
t <sub>r</sub>	Rise time	Resistive load			25	ns
t <sub>f</sub>	Fall time	Resistive load; as fig. 1			25	ns
V <sub>CC</sub>	Supply voltage operating voltage		10		36	V
V <sub>IN-H</sub>	High level input voltage				I <sub>bias</sub> /2 +300mV	V
V <sub>IN-L</sub>	Low level input voltage		I <sub>bias</sub> /2 -300mV			V
I <sub>IN-H</sub>	Hi level Input current	Pin voltage = I <sub>bias</sub>		1		μA

**ELECTRICAL CHARACTERISTICS** (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I <sub>IN-L</sub>	Low level input current	Pin voltage = 0.3V		1		μA
I <sub>PWRDN-H</sub>	Hi level PWRDN pin input current	I <sub>bias</sub> = 3.3V		35		μA
V <sub>L</sub>	Low logical state voltage V <sub>L</sub> (pin PWRDN, TRISTATE) (note 1)	I <sub>bias</sub> = 3.3V	0.8			V
V <sub>H</sub>	High logical state voltage V <sub>H</sub> (pin PWRDN, TRISTATE) (note 1)	I <sub>bias</sub> = 3.3V			1.7	V
I <sub>VCC-PWRDN</sub>	Supply Current from V <sub>cc</sub> in Power Down	PWRDN = 0			3	mA
I <sub>FAULT</sub>	Output Current pins FAULT -TH-WARN when FAULT CONDITIONS	V <sub>pin</sub> = 3.3V		1		mA
I <sub>VCC-hiz</sub>	Supply current from V <sub>cc</sub> in Tri-state	V <sub>cc</sub> =30V; Tri-state=0		22		mA
I <sub>VCC</sub>	Supply current from V <sub>cc</sub> in operation (both channel switching)	Input pulse width = 50% Duty; Switching Frequency = 384Khz; No LC filters;		80		mA
I <sub>VCC-q</sub>	I <sub>sc</sub> (short circuit current limit)		3.5	6	8	A
I <sub>OUT-SH</sub>	Undervoltage protection threshold			7		V
V <sub>OV</sub>	Output minimum pulse width	No Load	70		150	ns

Notes: 1. The following table explains the V<sub>L</sub>, V<sub>H</sub> variation with I<sub>bias</sub>

I <sub>bias</sub>	V <sub>L</sub> min	V <sub>H</sub> max	Unit
2.7	0.7	1.5	V
3.3	0.8	1.7	V
5	0.85	1.85	V

**LOGIC TRUTH TABLE** (see fig. 2)

TRI-STATE	INA	INB	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 1. Test Circuit.

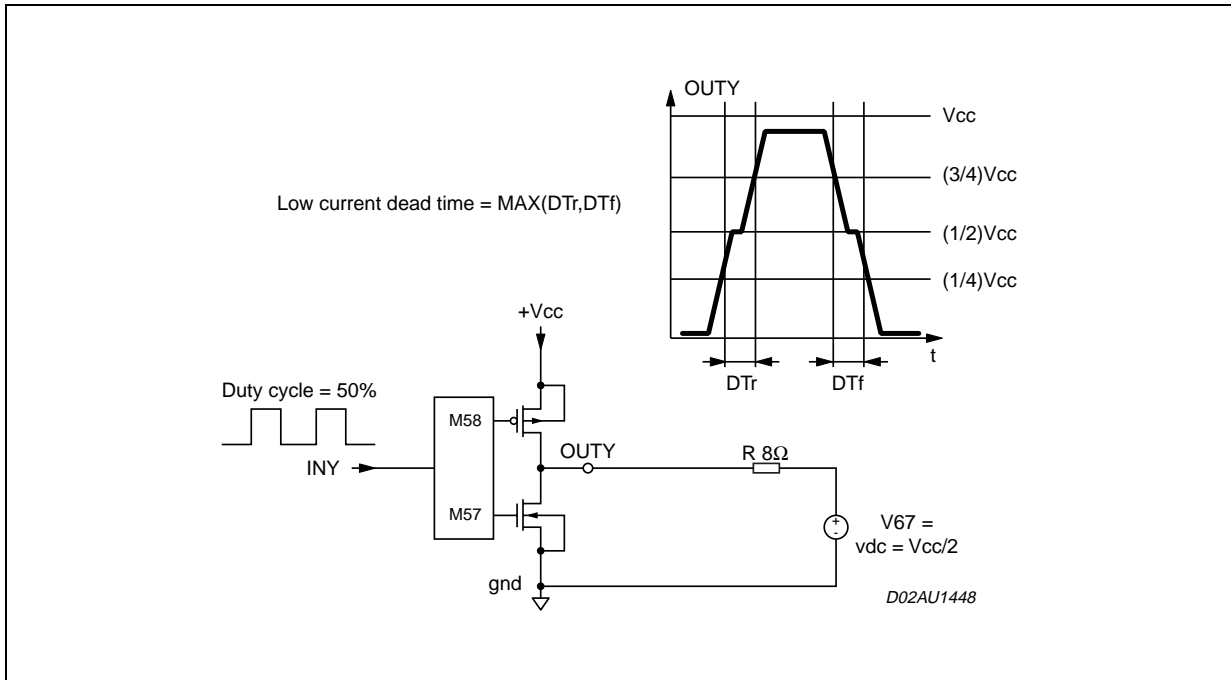


Figure 2.

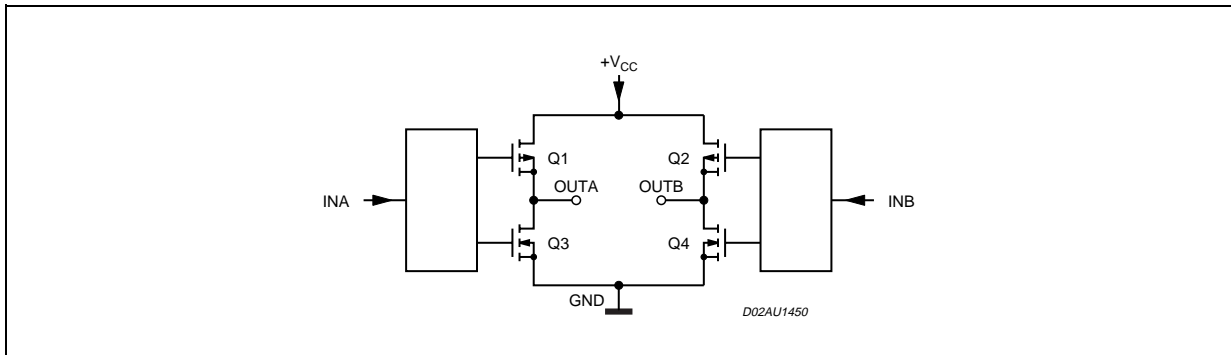
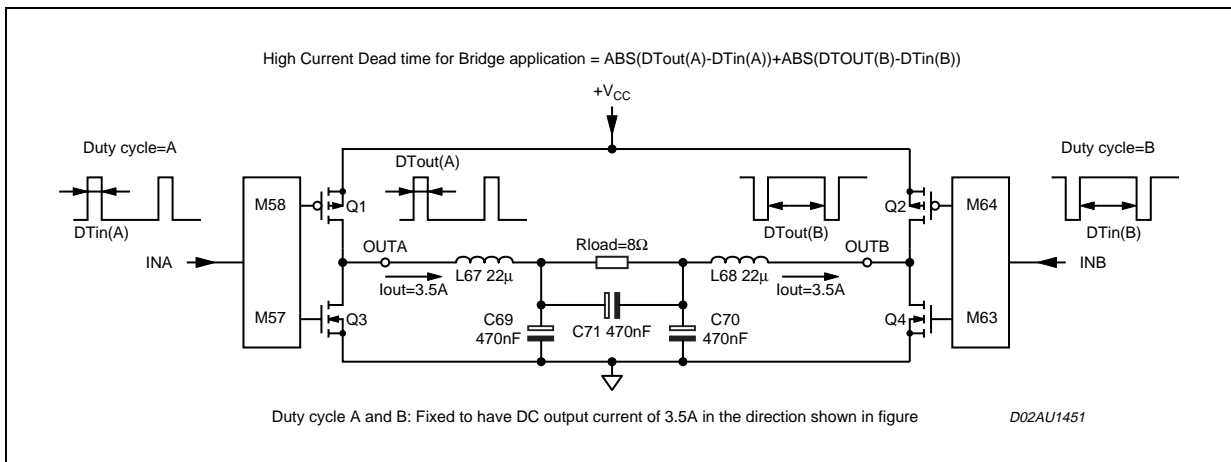


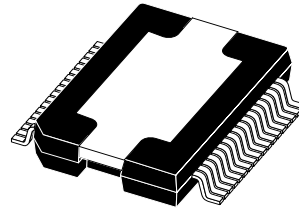
Figure 3.



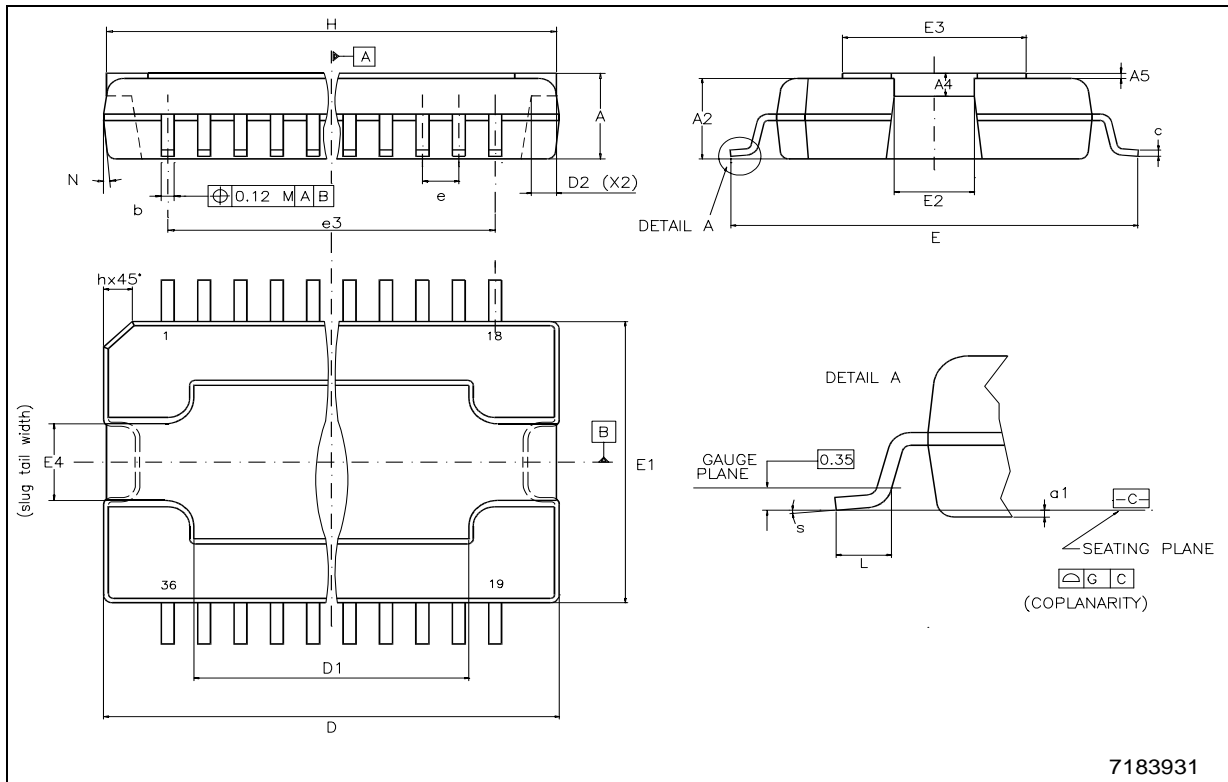
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	3.25		3.5	0.128		0.138
A2			3.3			0.13
A4	0.8		1	0.031		0.039
A5		0.2			0.008	
a1	0		0.075	0		0.003
b	0.22		0.38	0.008		0.015
c	0.23		0.32	0.009		0.012
D	15.8		16	0.622		0.630
D1	9.4		9.8	0.37		0.38
D2		1			0.039	
E	13.9		14.5	0.547		0.57
E1	10.9		11.1	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° (max)					
s	8° (max)					

- (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)**



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