SGS-THOMSON MICROELECTRONICS

L9930

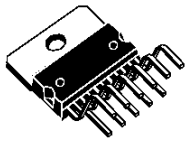
DUAL FULL BRIDGE

PRODUCT PREVIEW

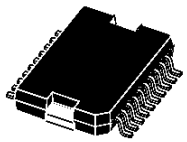
- $R_{DS\ ON}$ = 2Ω
- INTERNAL CLAMPING VOLTAGE = 32V
- INTERNAL FREE WHEELING DIODES
- PARALLEL DRIVE CAPABILITY
- RESISTIVE OR INDUCTIVE LOAD

PROTECTION:
- TEMPERATURE PROTECTION
- SHORT-CIRCUIT PROTECTION (V_{bat}, LOAD, GND)

DETECTION:
- SHORTED LOAD
- OPEN LOAD



Multiwatt11



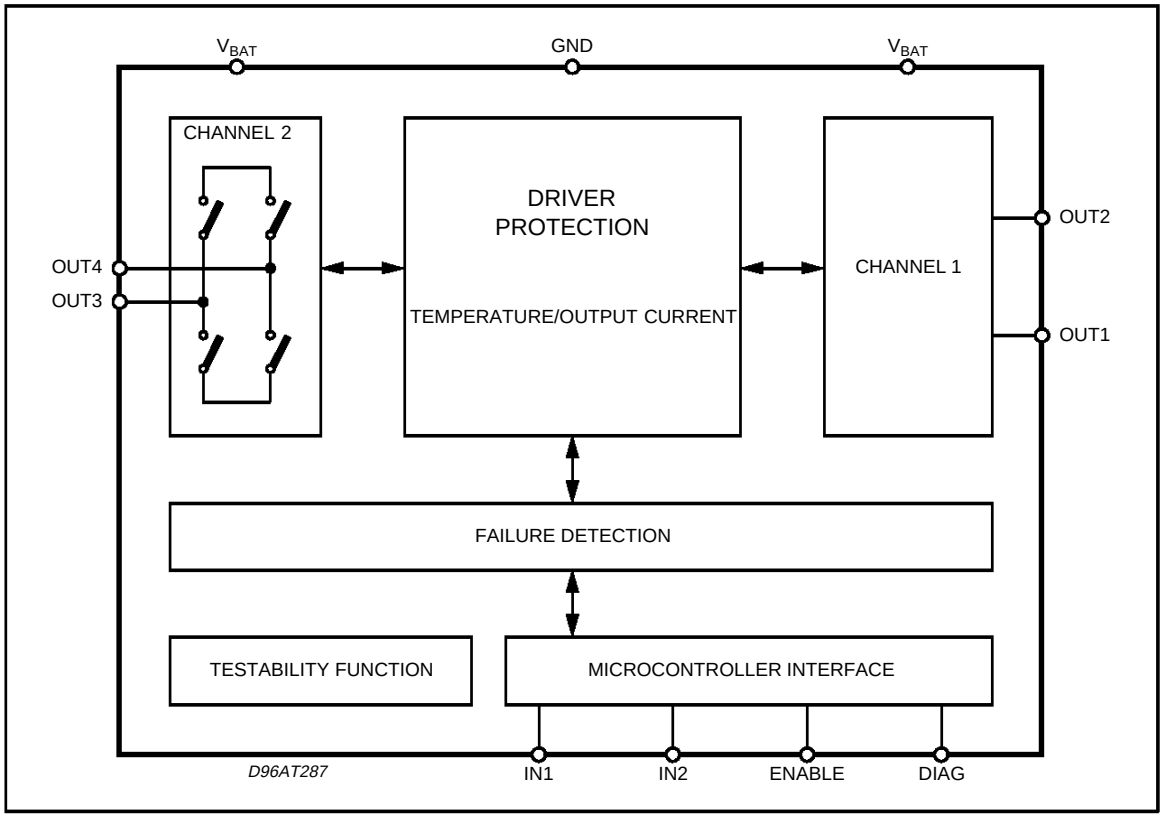
PowerSO20

ORDERING NUMBERS: L9930 (Multiwatt11)
L9930PD (PowerSO20)

DESCRIPTION

The L9930 is a dual full-bridge. The output stages are Power Mos switches.

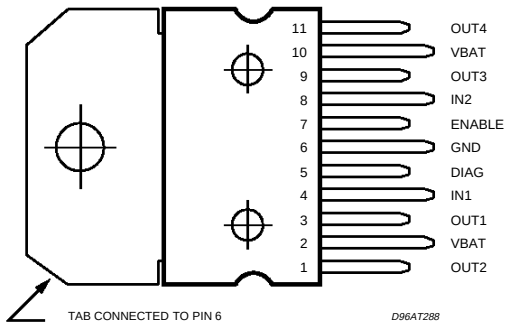
BLOCK DIAGRAM

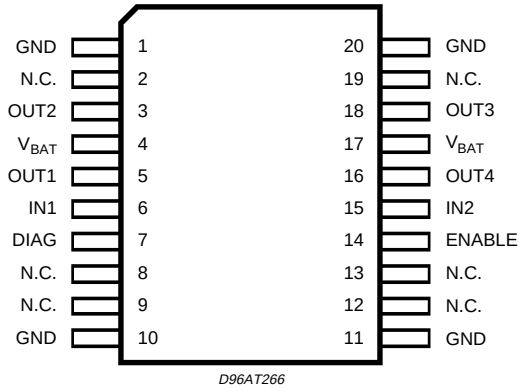


ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
E	Clamped Energy at the Switching off	70	mJ
$V_{out\,DC}$	Continuous Output Voltage	24	V
$V_{out\,tr}$	Transient Output Voltage	32	V
$V_{bat\,DC}$	Continuous Battery Voltage	8 to 24	V
$V_{bat\,tr}$	Transient Battery Voltage	45	V
I_{out}	Reverse Output Current	– 2	A
f_{in}	Input Frequency	500	Hz
V_{in}	Input Voltage	– 0.3 to +7	V
V_{diag}	Diagnostic Voltage	– 0.3 to +7	V
T_s	Storage Temperature	– 55 to 150	°C
T_j	Operating Junction Tem	– 40 to 150	°C
V_{ESD}	V_{ESD} (Note MIL STD 883C)	3000	V

PIN CONNECTION

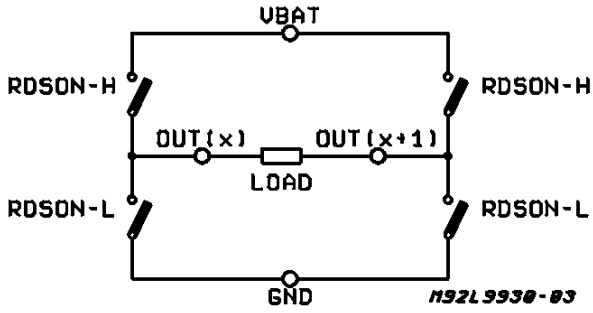




PIN FUNCTIONS

MW11	PowerSO20	Name	Function
1	3	OUT 2	Output Channel 1
2	4	V_{BAT}	Power Supply
3	5	OUT 1	Output Channel 1
4	6	IN 1	Input Channel 1
5	7	DIAG	Diagnostic Output Common for the 2 Channels
6	1, 10, 11, 20	GND	Ground
7	14	ENABLE	Enable
8	15	IN 2	Input Channel 2
9	18	OUT 3	Output Channel 2
10	17	V_{BAT}	Power Supply
11	16	OUT 4	Output Channel 2
	2, 8, 9, 12, 13, 19	NC	Not Connected

H - BRIDGE CONFIGURATION



THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction to Case	max.		°C/W
$R_{th\ j\text{-}amb}$	Thermal resistance Junction to Ambient	max.		°C/W

ELECTRICAL CHARACTERISTICS (V_{bat} = 8 to 18V tJ = – 40 to +150°C, unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$R_{DSon\text{-}H}$	ON Resistance	I_{out} = 0.5A		2	4.3	Ω
$R_{DSon\text{-}L}$	ON Resistance	I_{out} = 0.5A		2	4.3	Ω
V_{OCL}	Clamping Voltage	I_{out} = 0.1A		32		V
V_F	Clamp Diode Forward Voltage	I_{out} = 0.5A (see fig. 1)		1.3		V
T_R	Output Voltyage Rise Time	V_{out}; 0.1 to 0.9 V_{out} (see fig. 1)		50	100	µs
T_F	Output Voltage Fall Time	Vout; 0.9 to 0.1 V_{out} (see fig. 1)		50	100	µs
T_{DR}	Input to Output Rising edge Delay	0.5 V_{IN} to 0.1 V_{OUT} (see fig. 1)			50	µs
T_{DF}	Input to Output Falling Edge Delay	0.5 VIN to 0.9 V_{OUT} (see fig. 1)			50	µs

OUTPUT PROTECTIONS CHARACTERISTICS

I_{SC}	Short Circuit	T_{amb} = -40°C	0.45		2.4	A
		T_{amb} = 25°C	0.38		2.4	A
		T_{amb} = 125°C	0.28		2.4	A
T_{SD}	Temperature		160			°C
T_{HYST}	Temperature Hysteresis			20		°C

These protections switch off the full bridge.

OUTPUT DETECTIONS CHARACTERISTICS

$R_{OPL\text{-}L}$	Open-load Threshold Resistor		100			Ω
$R_{OPL\text{-}H}$			200			Ω

SUPPLY CHARACTERISTICS

I_{QHI}	Supply Current	$I_{out1–R}$ = $I_{out2–R}$ = 0.5A $I_{out1–L}$ = $I_{out2–L}$ = 0.5A V_{BAT} = 14V			15	mA
I_{QLO}		R_{load1} = R_{load2} = 50Ω V_{BAT} = 12V, ENABLE = 0			0.5	mA

ELECTRICAL CHARACTERISTICS

INPUTS CHARACTERISTICS (normal and standby mode)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IH}	High Threshold				4	V
V_{IL}	Low Threshold		1			V
I_{NHI}	Input Current 1	V_{IN} = 4V			200	µA
I_{NLO}	Input Current 2	V_{IN} = 1V			200	µA

DIAGNOSTIC CHARACTERISTICS

V_{DIAGL}	Low Level Voltage	I_{DIAG} = 2mA		0.6	0.8	V
I_{DIAGH}	Leakage Current	V_{DIAG} = 5.25V		5	10	µA

INITIALIZATION CHARACTERISTICS

T_{INIT}	Initialization Timing	V_{BAT} = 12V	10			µs
T_{STUP}	Start-Up Timing	V_{BAT} = 12V	1			ms

TRUE TABLE

ENAB	IN1	IN2	OUT1	OUT2	OUT3	OUT4	MODE	DIAG
0	0	0	HZ	HZ	HZ	HZ	STANDBY	?
0	0	1	HZ	HZ	HZ	HZ	NORMAL	?
0	1	0	HZ	HZ	HZ	HZ	NORMAL	?
0	1	1	HZ	HZ	HZ	HZ	NORMAL	?
1	0	0	HSD	LSD	HSD	LSD	NORMAL	VALID
1	0	1	HSD	LSD	LSD	HSD	NORMAL	VALID
1	1	0	LSD	HSD	HSD	LSD	NORMAL	VALID
1	1	1	LSD	HSD	LSD	HSD	NORMAL	VALID

Figure 1: Initialization.

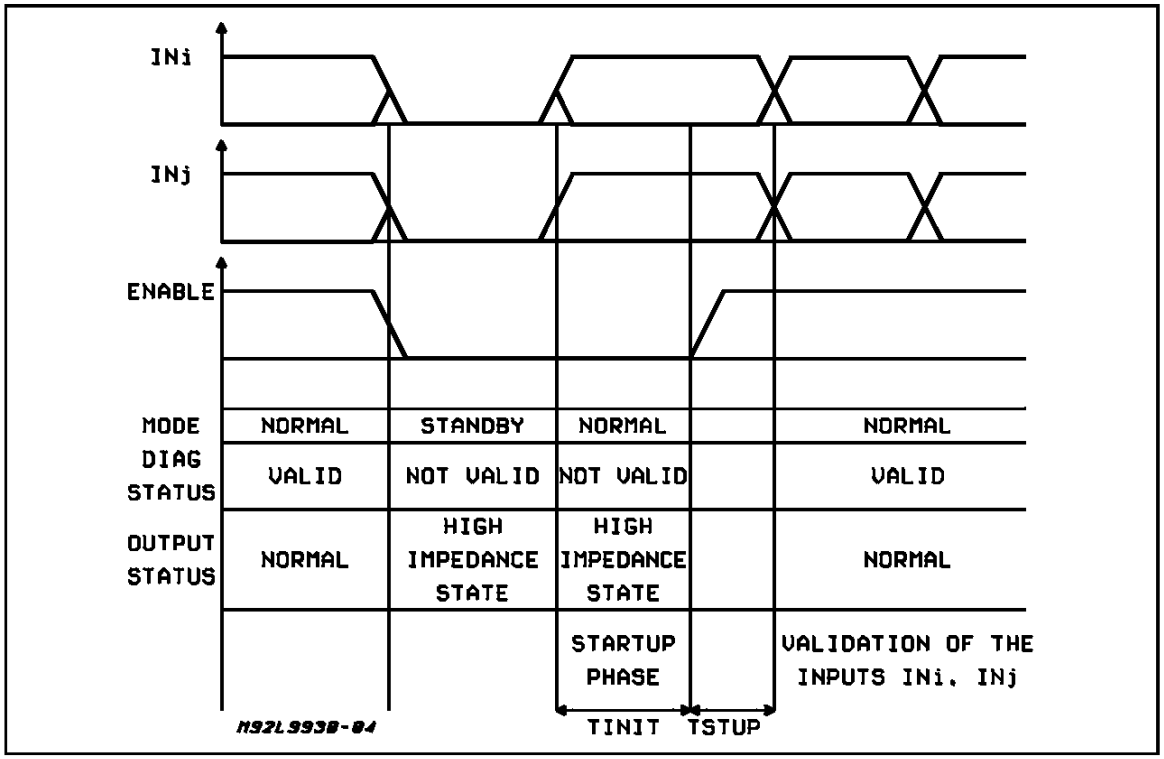


Figure 2: Normal Condition.

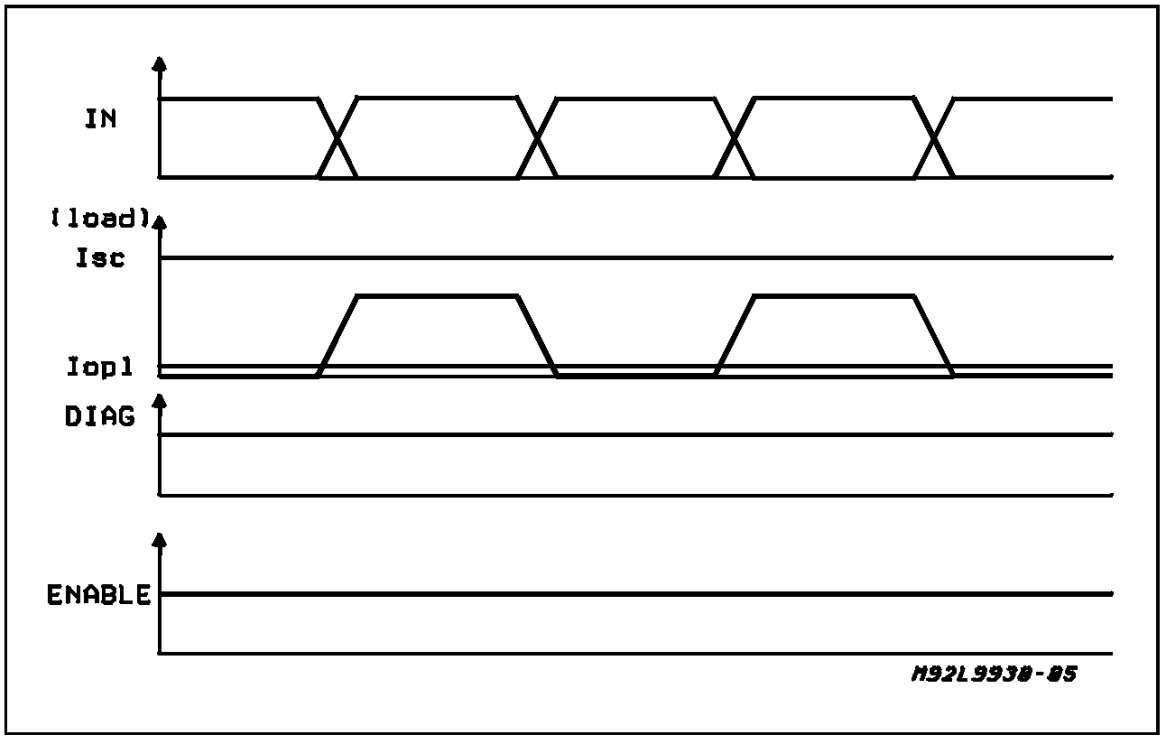


Figure 3: Short-circuit Condition.

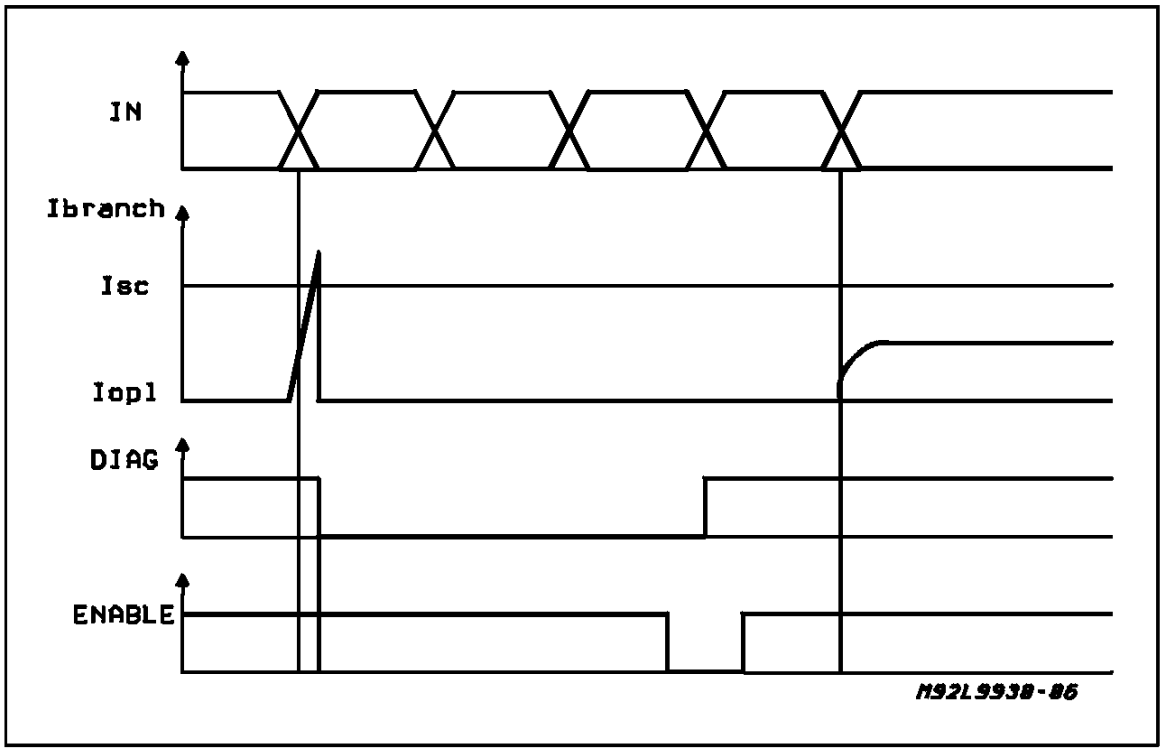
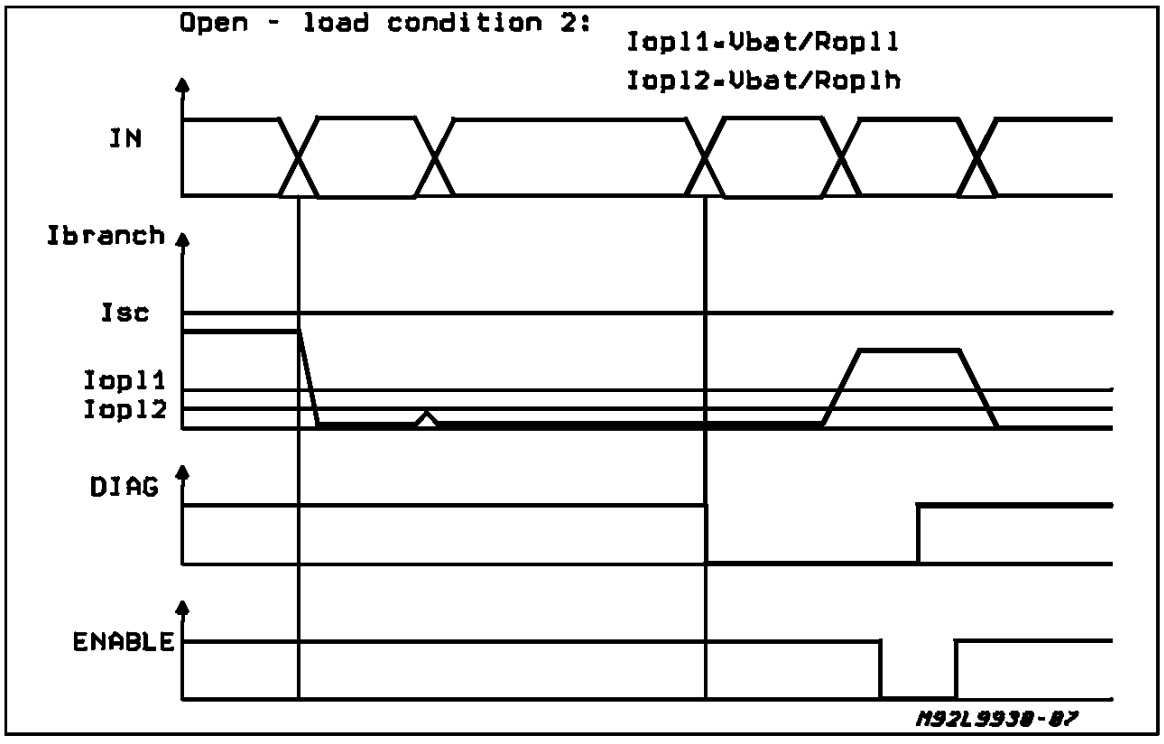
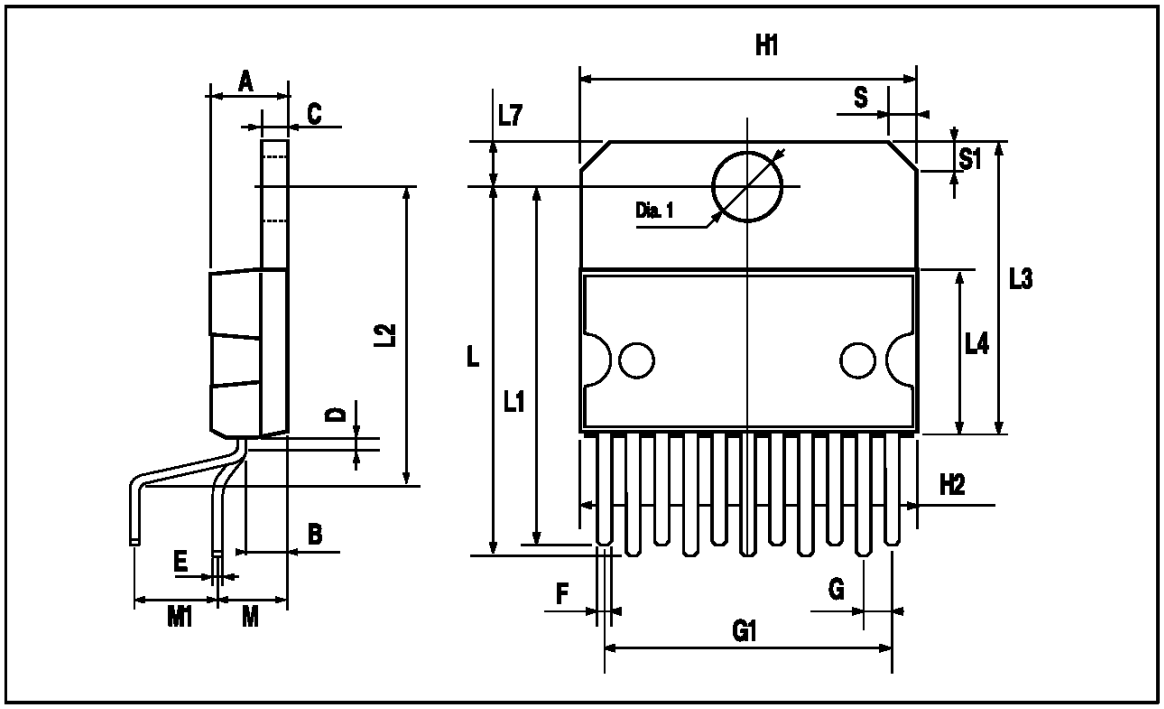


Figure 4.



MULTIWATT11 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.88		0.95	0.035		0.037
G	1.45	1.7	1.95	0.057	0.067	0.077
G1	16.75	17	17.25	0.659	0.669	0.679
H1	19.6			0.772		
H2			20.2			0.795
L	21.9	22.2	22.5	0.862	0.874	0.886
L1	21.7	22.1	22.5	0.854	0.87	0.886
L2	17.4		18.1	0.685		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.25	4.55	4.85	0.167	0.179	0.191
M1	4.73	5.08	5.43	0.186	0.200	0.214
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia1	3.65		3.85	0.144		0.152



PowerSO20 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			3.60			0.1417
a1	0.10		0.30	0.0039		0.0118
a2			3.30			0.1299
a3	0		0.10	0		0.0039
b	0.40		0.53	0.0157		0.0209
c	0.23		0.32	0.009		0.0126
D (1)	15.80		16.00	0.6220		0.6299
E	13.90		14.50	0.5472		0.570
e		1.27			0.050	
e3		11.43			0.450	
E1 (1)	10.90		11.10	0.4291		0.437
E2			2.90			0.1141
G	0		0.10	0		0.0039
h			1.10			
L	0.80		1.10	0.0314		0.0433
N	10° (max.)					
S	8° (max.)					
T		10.0			0.3937	

(1) "D and E1" do not include mold flash or protrusions
- Mold flash or protrusions shall not exceed 0.15mm (0.006")