

60V 3.6mohm N-channel SGT MOSFET
EPG6N036WM**Description:**

This N channel SGT MOSFET has been designed to low on-state resistance and maintain superior switching performance, especially for high efficiency power management applications.

Features:

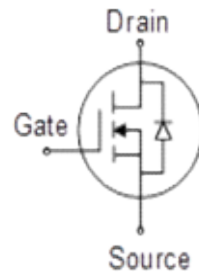
- Low $R_{DS(ON)}$
- RoHS compliant (Note 1)
- Halogen-free (Note 1)
- 100% UIS Tested
- AEC-Q101 qualified (Automotive grade with suffix "Q".)
- Expsemi electronics

Applications:

- Battery Management System
- Motor Drivers
- DC-DC Converter

Key Performance Parameters:

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(ON), max} @V_{GS} = 10V$	3.6	m Ω
I_D	120	A

**Ordering Information:**

Ordering Code	Package Type	Marking Code	Form	Packing
EPG6N036WM	TO-247	G6N036WM	Tube	300PCS

Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Units
V _{DS}	Drain-Source Voltage	60	V
I _D	Drain Current - Continuous (T _C = 25°C) ^(Note 1)	164	A
	Drain Current - Continuous (T _C = 25°C) ^(Note 2)	120	A
	Drain Current - Continuous (T _C = 100°C)	104	A
I _{DM}	Drain Current - Pulsed ^(Note 3)	440	A
V _{GS}	Gate-Source Voltage	± 20	V
E _{AS}	Single Pulsed Avalanche Energy ^(Note 4)	342	mJ
P _D	Power Dissipation (T _C = 25°C)	227	W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Junction-to-Case, Steady-State	0.55	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient, Steady State ^(Note 5)	30	°C/W

Notes:

1. The max drain current rating is silicon limited
2. The max drain current rating is package limited
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. L = 0.5 mH, V_{DD} = 30 V, I_{AS} = 37 A, R_G = 25 Ω, Starting T_J = 25 °C
5. Mount on minimum PCB layout

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60 V, V _{GS} = 0 V			1	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ± 20 V, V _{DS} = 0 V			± 100	nA
V _{GS(TH)}	Gate Threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	2	3	4	V
R _{DS(ON)}	Drain-Source on-state resistance	V _{GS} = 10 V, I _D = 60 A		3	3.6	mΩ
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{DS} = 30 V, V _{GS} = 0 V, F = 1 MHz		6110		pF
C _{OSS}	Output Capacitance			1340		pF
C _{RSS}	Reverse Transfer Capacitance			100		pF
R _G	Gate Resistance	F = 1 MHz		1.5		Ω
Switching Characteristics						
T _{D(ON)}	Turn On Delay Time	V _{DD} = 30 V , R _L = 0.5 Ω, V _{GS} = 10 V, R _G =4.7 Ω		27		nS
T _R	Rise Time			57		nS
T _{D(OFF)}	Turn Off Delay Time			71		nS
T _F	Fall Time			98		nS
Q _G	Total Gate Charge	V _{DD} = 30 V , I _D = 60 A, V _{GS} = 10 V		81		nC
Q _{GS}	Gate-Source Charge			27		nC
Q _{GD}	Gate-Drain Charge			8		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body-Diode Forward Current			120		A
I _{SM}	Maximum Pulsed Body-Diode Forward Current ^(NOTE 1)			440		A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 50 A		0.9		V
T _{RR}	Reverse recovery time	V _{DD} = 30 V, I _D = 60 A, di/dt = 100 A/μS		60		nS
Q _{RR}	Reverse recovery charge			126		nC
I _{RRM}	Peak Reverse Recovery Current			3.5		A

Electrical Characteristics Diagrams

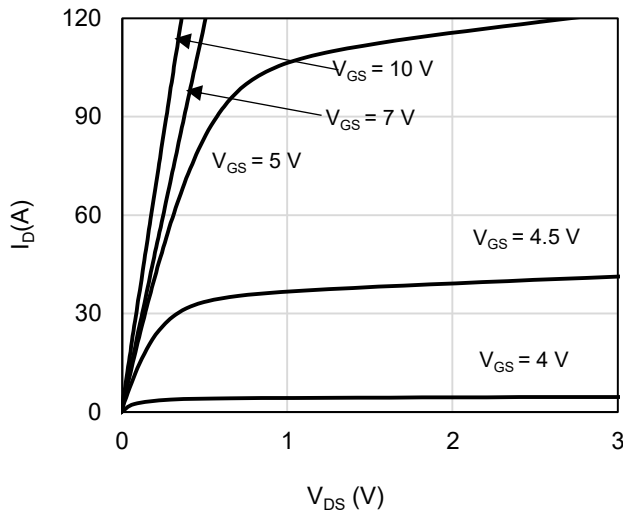


Figure 1: On-Region Characteristics

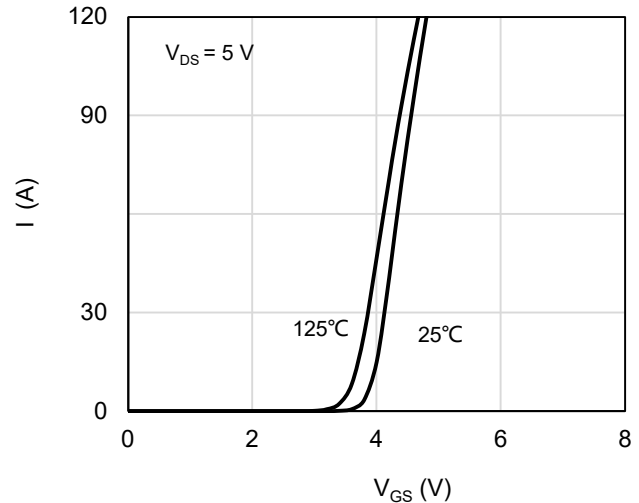


Figure 2: Transfer Characteristics

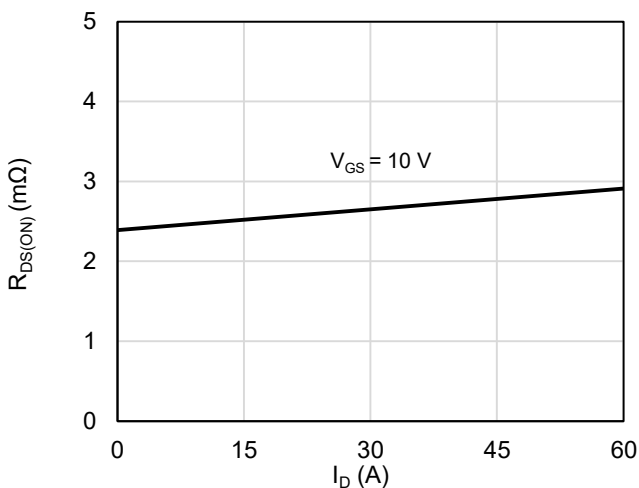


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

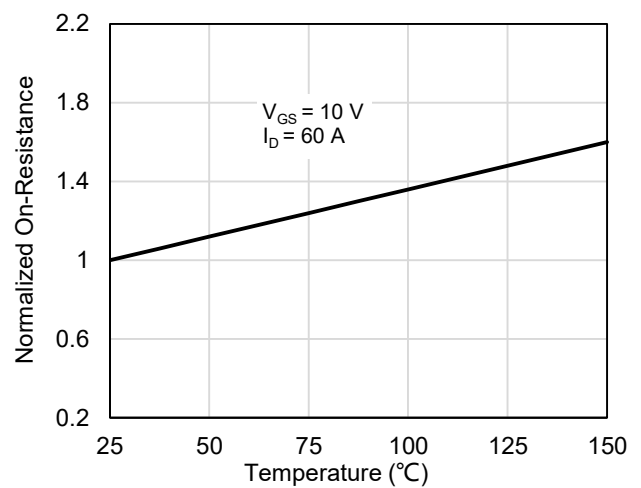


Figure 4: On-Resistance vs. Junction Temperature

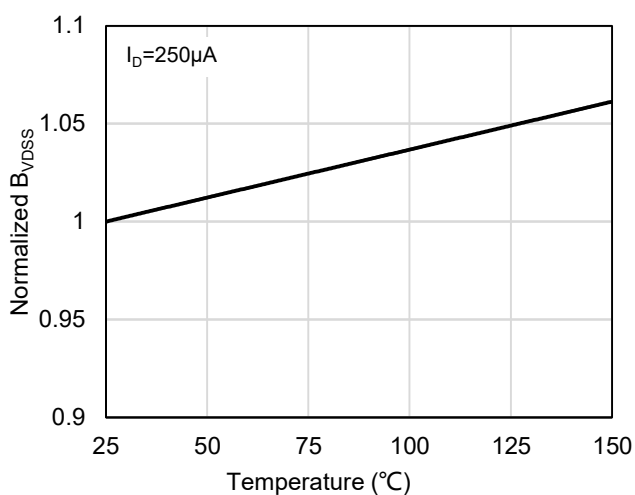


Figure 5: Breakdown Voltage vs. Junction Temperature

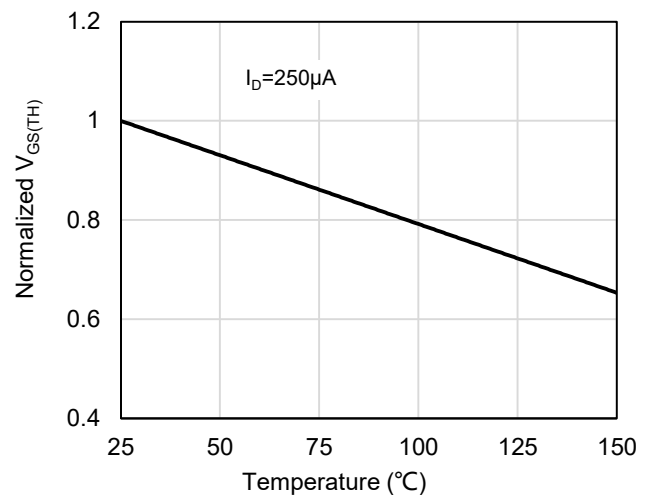


Figure 6: Threshold Voltage vs. Junction Temperature

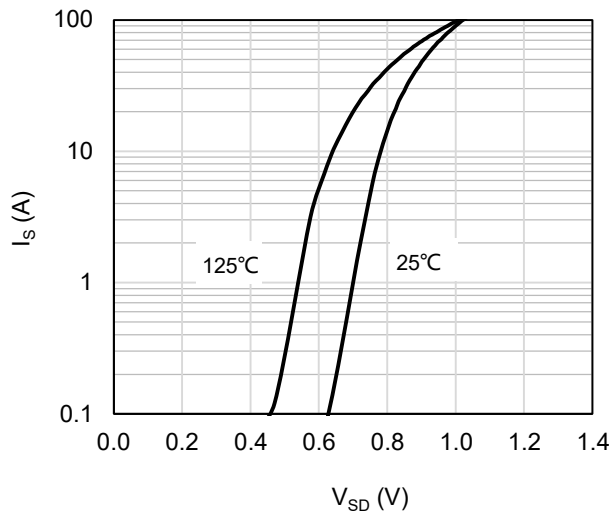


Figure 7: Body-Diode Characteristics

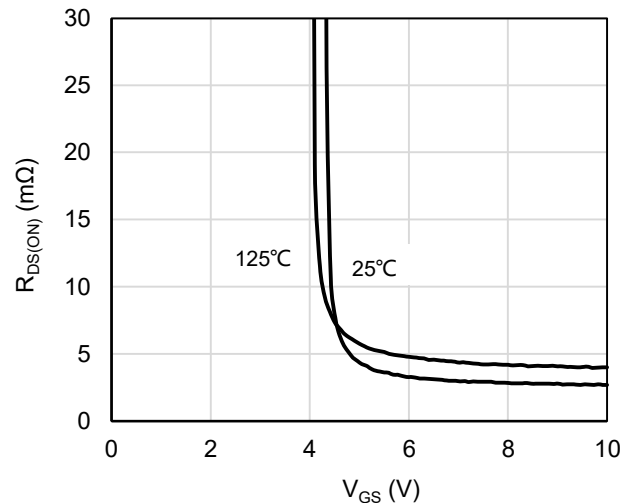


Figure 8: On-Resistance vs. Gate-Source Voltage

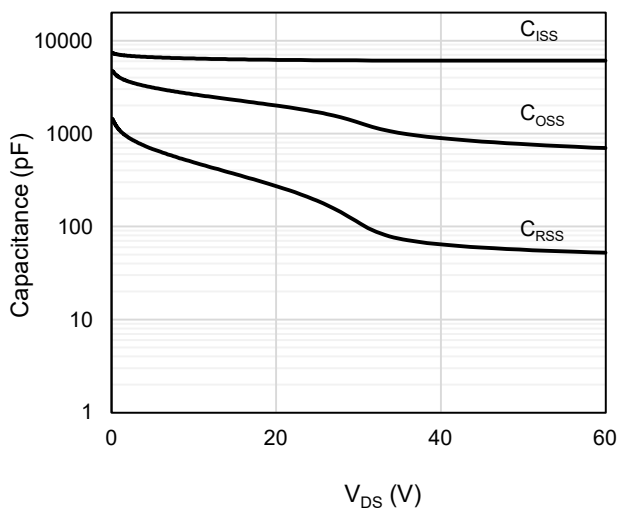


Figure 9: Capacitance Characteristics

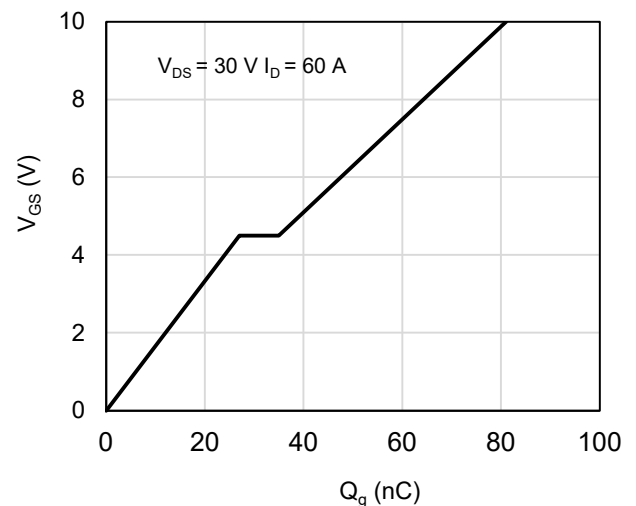


Figure 10: Gate-Charge Characteristics

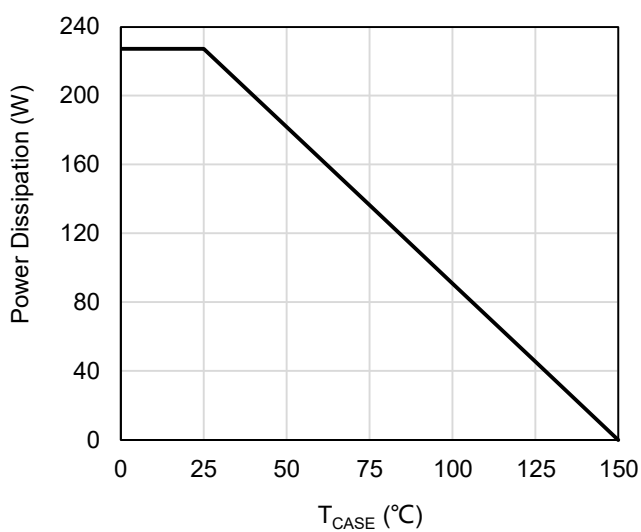


Figure 11: Power De-rating

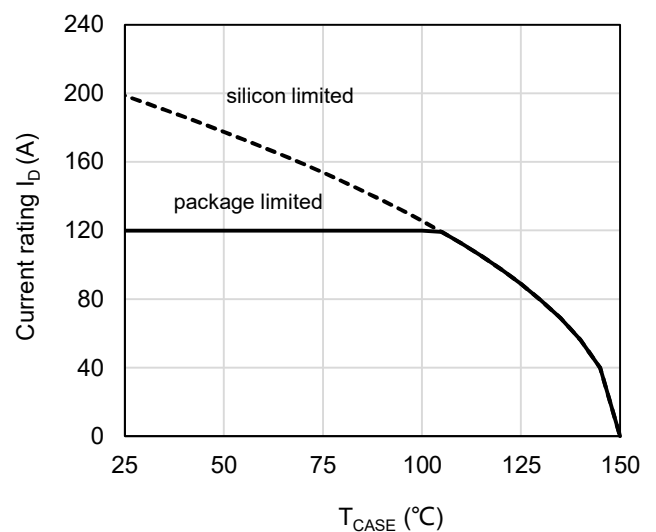


Figure 12: Current De-rating

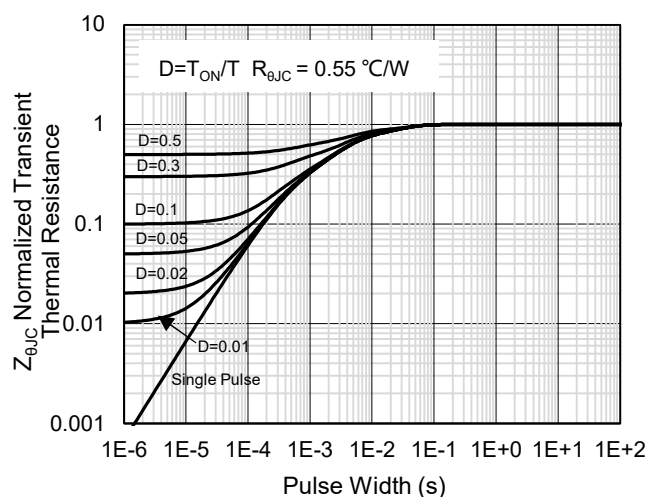


Figure 13: Normalized Maximum Transient Thermal Impedance

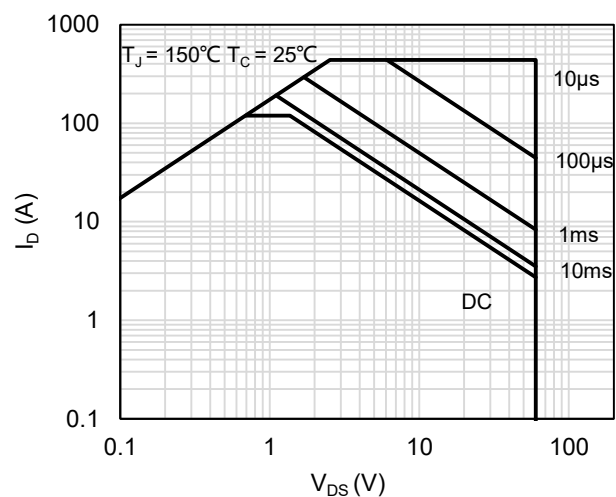
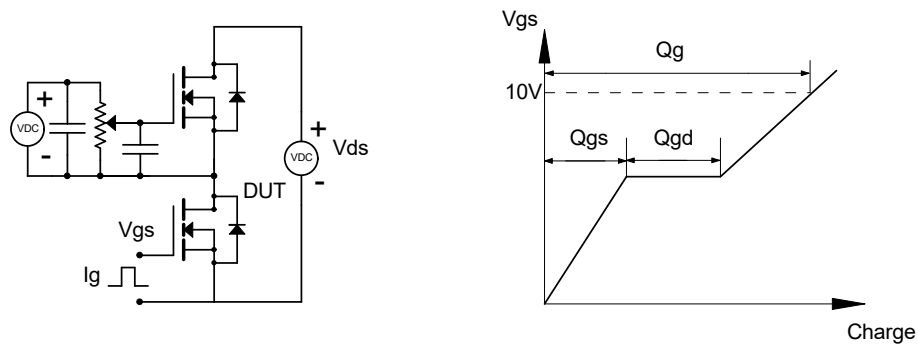


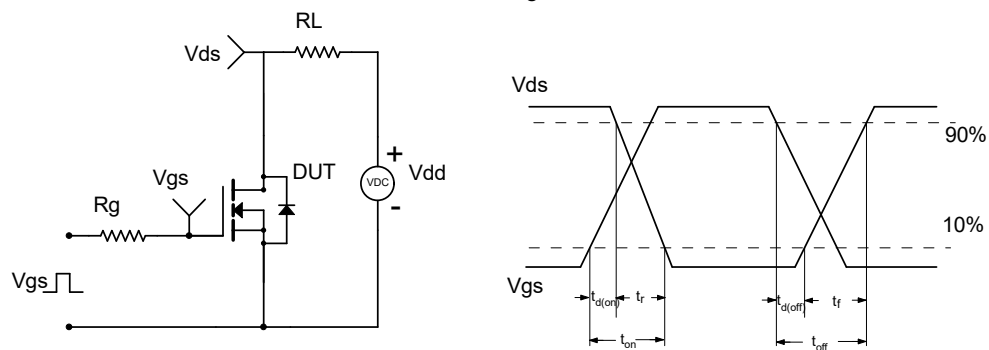
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

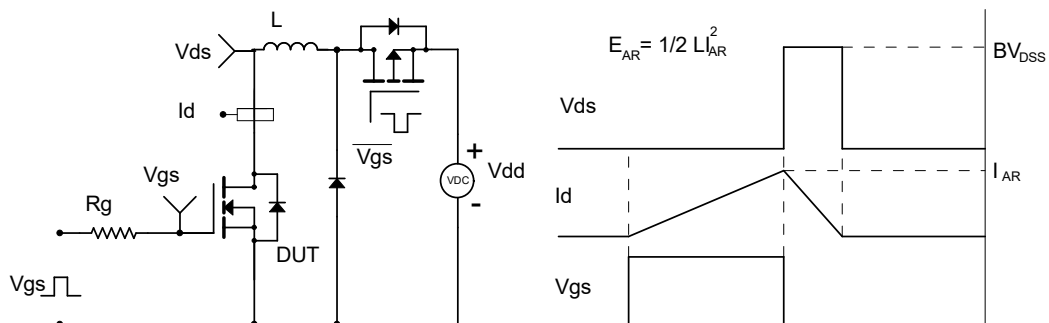
Gate Charge Test Circuit & Waveform



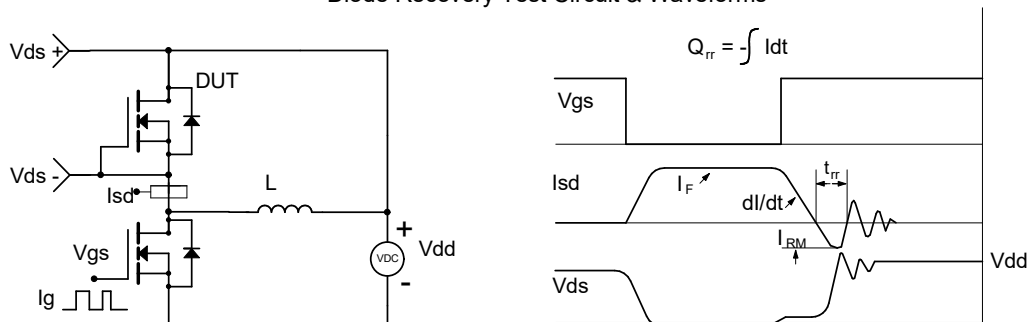
Resistive Switching Test Circuit & Waveforms



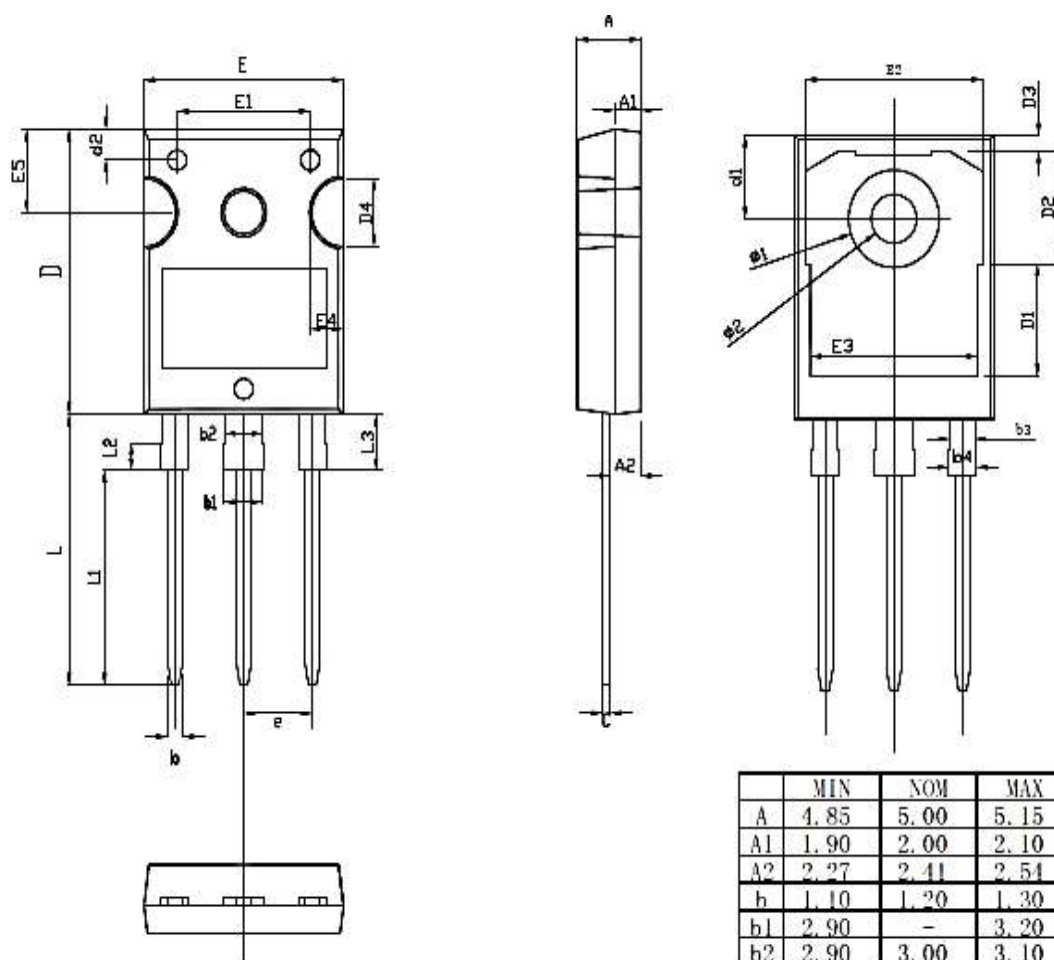
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



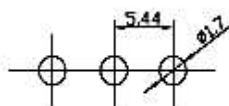
Diode Recovery Test Circuit & Waveforms



Package Outlines



RECOMMENDED LAND PATTERN



UNIT:mm

	MIN	NOM	MAX
A	4.85	5.00	5.15
A1	1.90	2.00	2.10
A2	2.27	2.41	2.54
b	1.10	1.20	1.30
b1	2.90	-	3.20
b2	2.90	3.00	3.10
b3	1.90	2.00	2.10
b4	2.00	-	2.20
c	0.55	0.60	0.68
D	20.80	21.00	21.10
D1		8.23	
D2		8.32	
D3		1.17	
D4	3.68	4.90	5.10
d1	6.04	6.15	6.30
d2	2.20	2.30	2.40
E	15.70	15.80	16.00
E1		10.50	
E2		14.02	
E3		13.50	
E4	2.20	2.40	2.60
E5	5.49	5.80	6.00
e	5.34	5.44	5.54
L	19.72	19.92	20.12
L1		15.79	
L2		1.98	
L3	4.00	4.10	4.47
z1	7.10	7.19	7.30
z2	3.50	3.60	3.70