

### Features

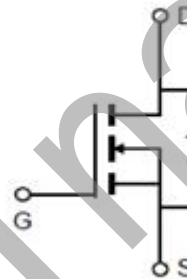
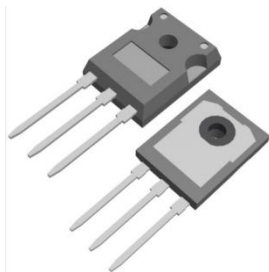
- Uses advanced SGT technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)

### Application

- Motor control and drives
- Battery management
- DC/DC converter
- General purpose applications

### Product Summary

	TO-247
$V_{DS}$	100V
$R_{DS(on)@V_{GS}=10V}$	3.5m $\Omega$
$I_D$	160A



### Package Marking and Ordering Information

Type	Package	Marking	Reel Size	Tape Width	Packing	Qty
LR045N10S1	TO-247	LR045N10S1	-	-	Tube	30

### Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	100	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	$I_D$	220 160 110	A
Pulsed drain current $T_C = 25^\circ\text{C}$ , $t_p$ limited by $T_{jmax}$	$I_{D\ pulse}$	480	
Avalanche energy, single pulse (L=0.5mH,Rg=25 $\Omega$ )	$E_{AS(max)}$	1200	mJ
Gate-Source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_C = 25^\circ\text{C}$	$P_D$	227	W
Operating junction and storage temperature	$T_j, T_{stg}$	-55~150	$^\circ\text{C}$

**Thermal Resistance**

	Symbol	Value	Unit
Thermal resistance, junction – case. Max	$R_{thJC}$	0.44	°C/W
Thermal resistance, junction – ambient. Max	$R_{thJA}$	60	

**Electrical Characteristic, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	

**Static Characteristic**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$ $T_j=25\text{ °C}$	-	-	1	$\mu A$
		$V_{DS}=80V, V_{GS}=0V$ $T_j=125\text{ °C}$	-	-	10	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=50A,$ $T_j=25\text{ °C}$	-	3.5	4.5	mΩ
Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=50A$	170	-	-	S

**Dynamic Characteristic**

Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=50V,$ $f=1MHz$	-	6772	-	pF
Output Capacitance	$C_{oss}$		-	952	-	
Reverse Transfer Capacitance	$C_{rss}$		-	33	-	
Gate Total Charge	$Q_G$	$V_{GS}=10V, V_{DS}=50V,$ $I_D=50A$	-	90	-	nC
Gate-Source charge	$Q_{gs}$		-	30	-	
Gate-Drain charge	$Q_{gd}$		-	19	-	
Turn-on delay time	$t_{d(on)}$	$T_j=25\text{ °C}, V_{GS}=10V,$ $V_{DS}=50V, R_L=3\Omega$	-	25	-	ns
Rise time	$t_r$		-	32	-	
Turn-off delay time	$t_{d(off)}$		-	48	-	
Fall time	$t_f$		-	27	-	
Gate resistance	$R_G$	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$	-	2	-	Ω

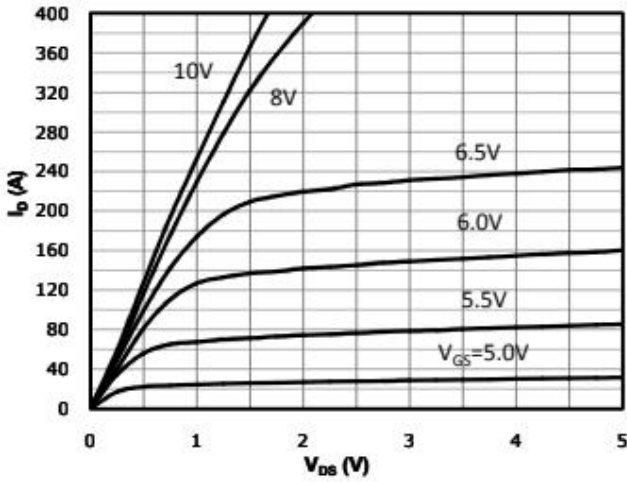
**Body Diode Characteristic**

Body Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_{SD}=50A$	-	0.90	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=30A,$ $dI/dt=500A/\mu s$	-	80	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F=30A,$ $dI/dt=500A/\mu s$	-	185	-	nC

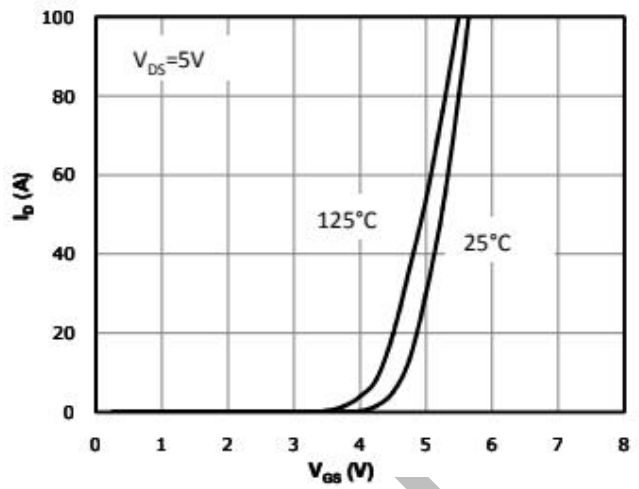
Preliminary

**Typical Performance Characteristics**

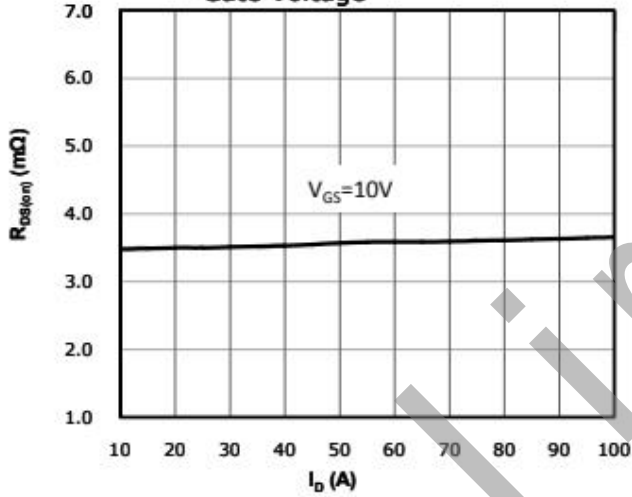
**Fig 1: Output Characteristics**



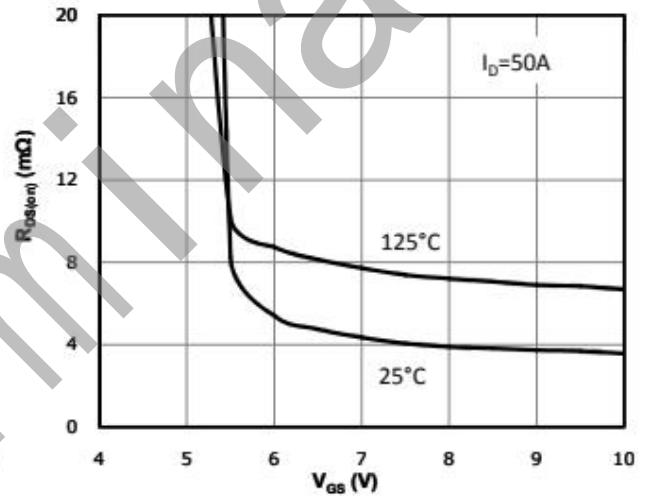
**Fig 2: Transfer Characteristics**



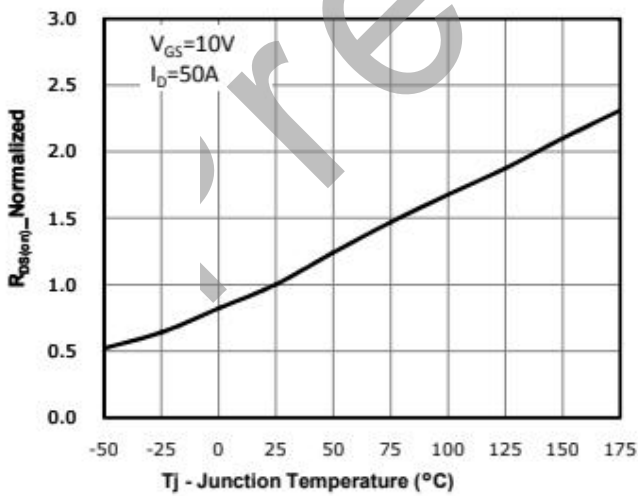
**Fig 3: Rds(on) vs Drain Current and Gate Voltage**



**Fig 4: Rds(on) vs Gate Voltage**



**Fig 5: Rds(on) vs. Temperature**



**Fig 6: Capacitance Characteristics**

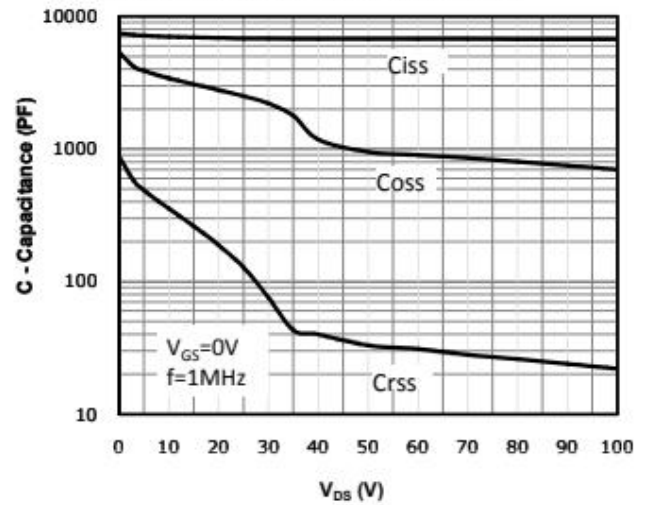


Fig 7: Gate Charge Characteristics

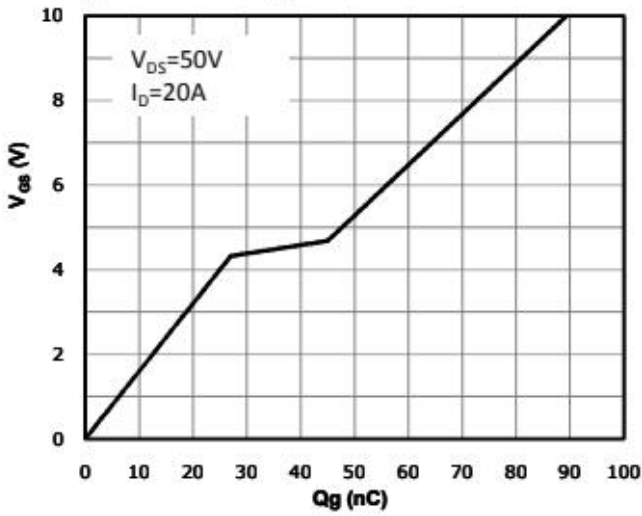


Fig 8: Body-diode Forward Characteristics

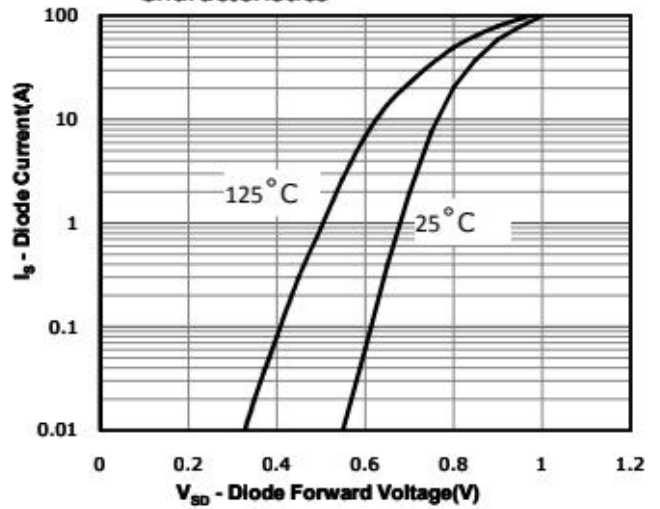


Fig 9: Power Dissipation

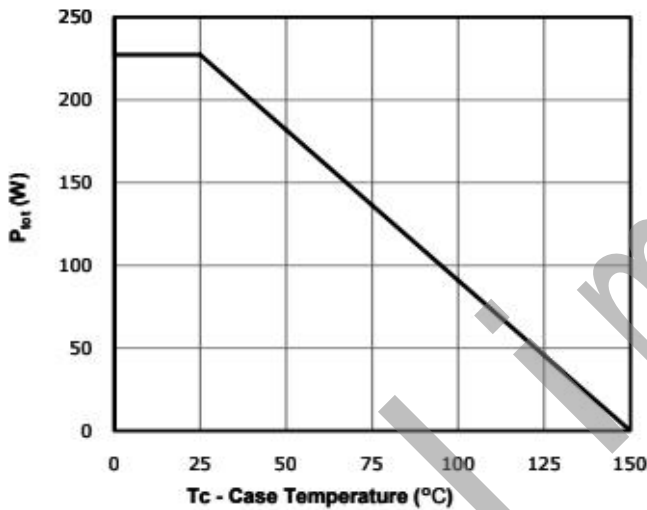


Fig 10: Drain Current Derating

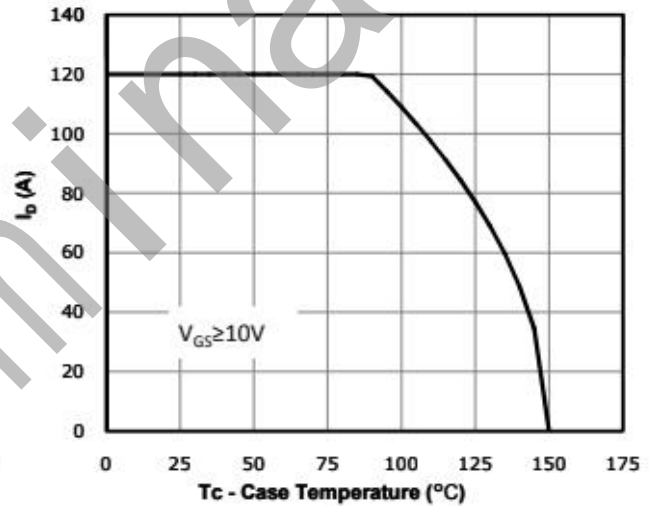


Fig 11: Safe Operating Area

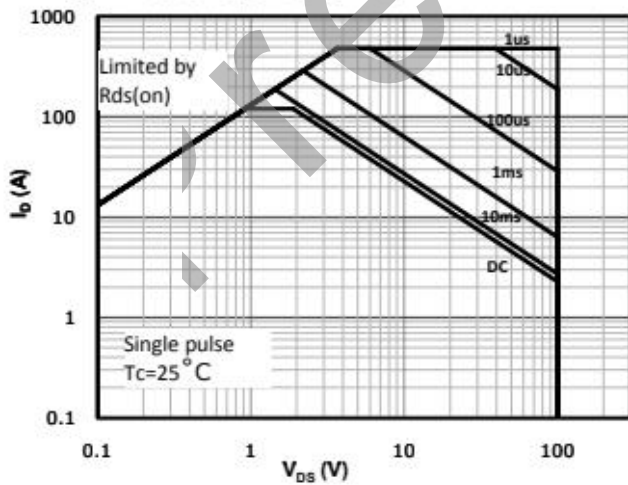
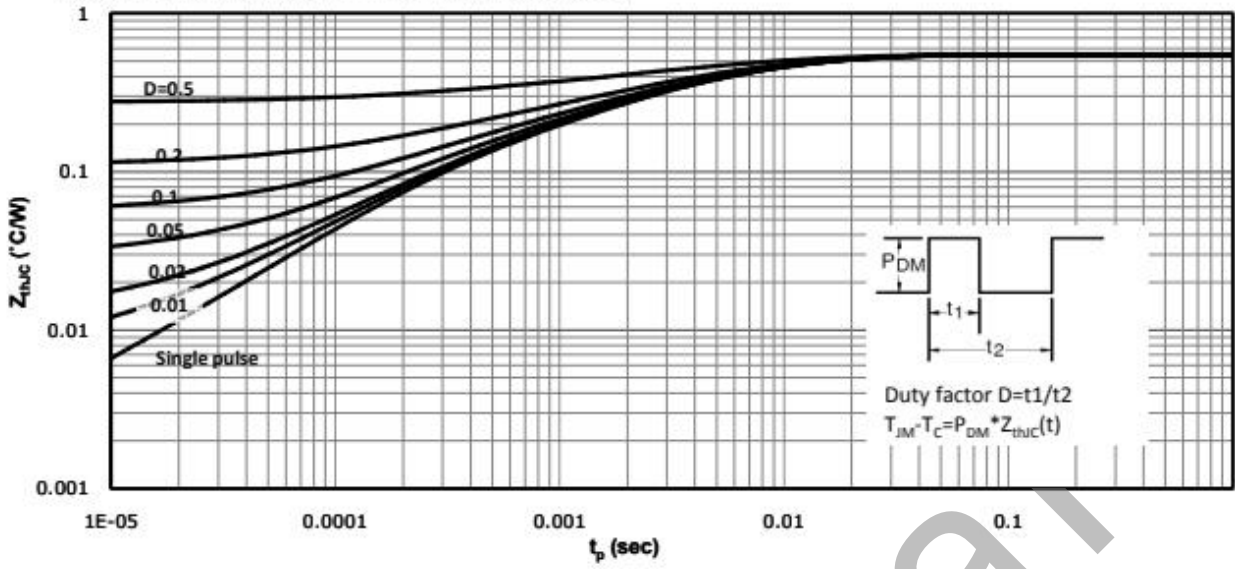
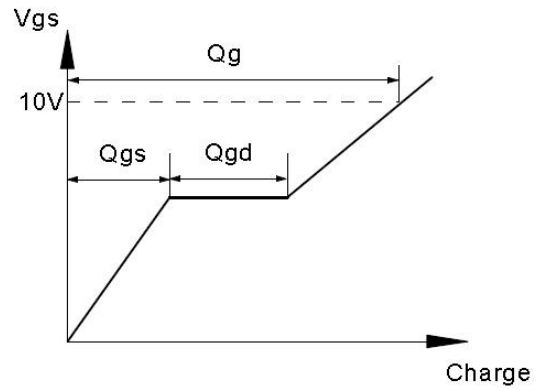
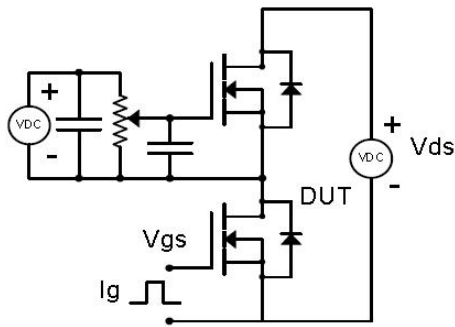


Fig 12: Max. Transient Thermal Impedance

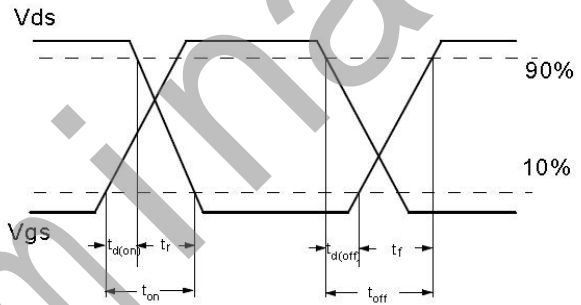
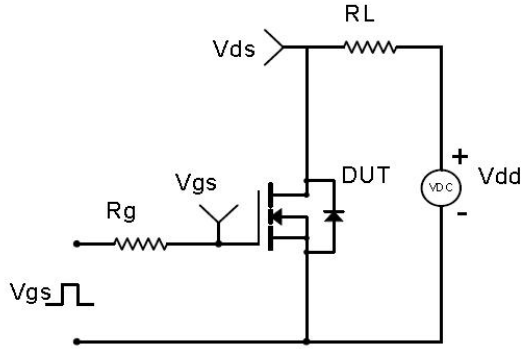


**Test Circuit & Waveform**

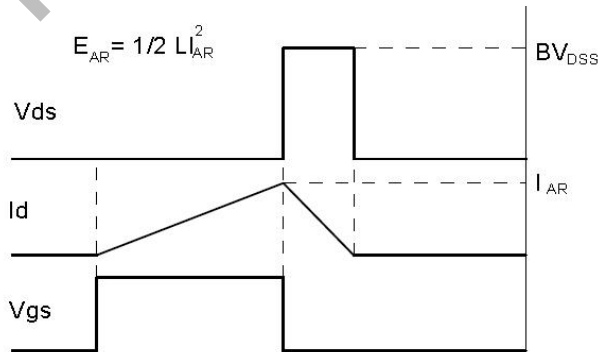
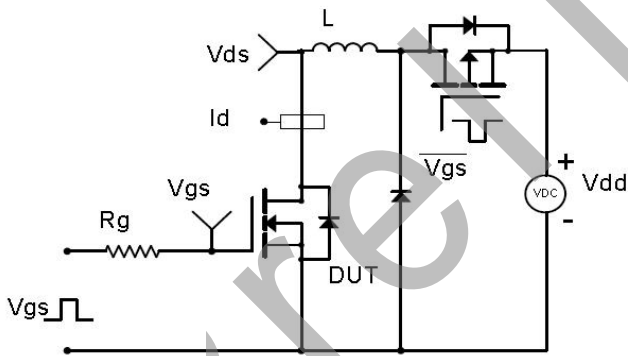
Gate Charge Test Circuit & Waveform



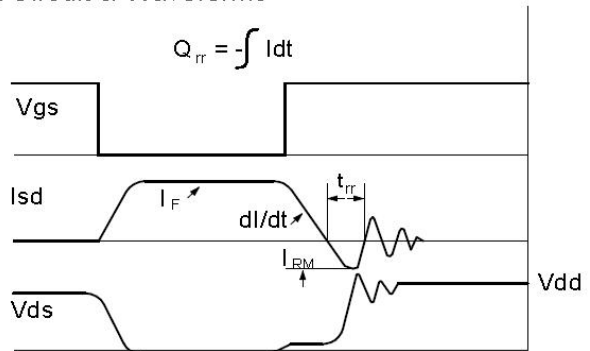
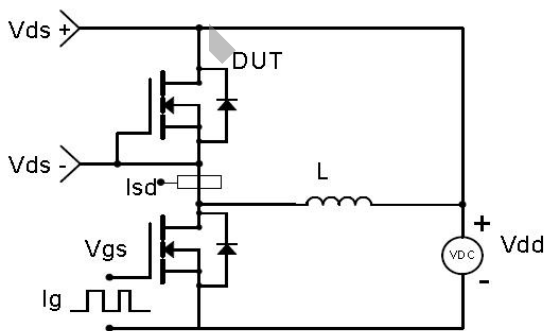
Resistive Switching Test Circuit & Waveforms



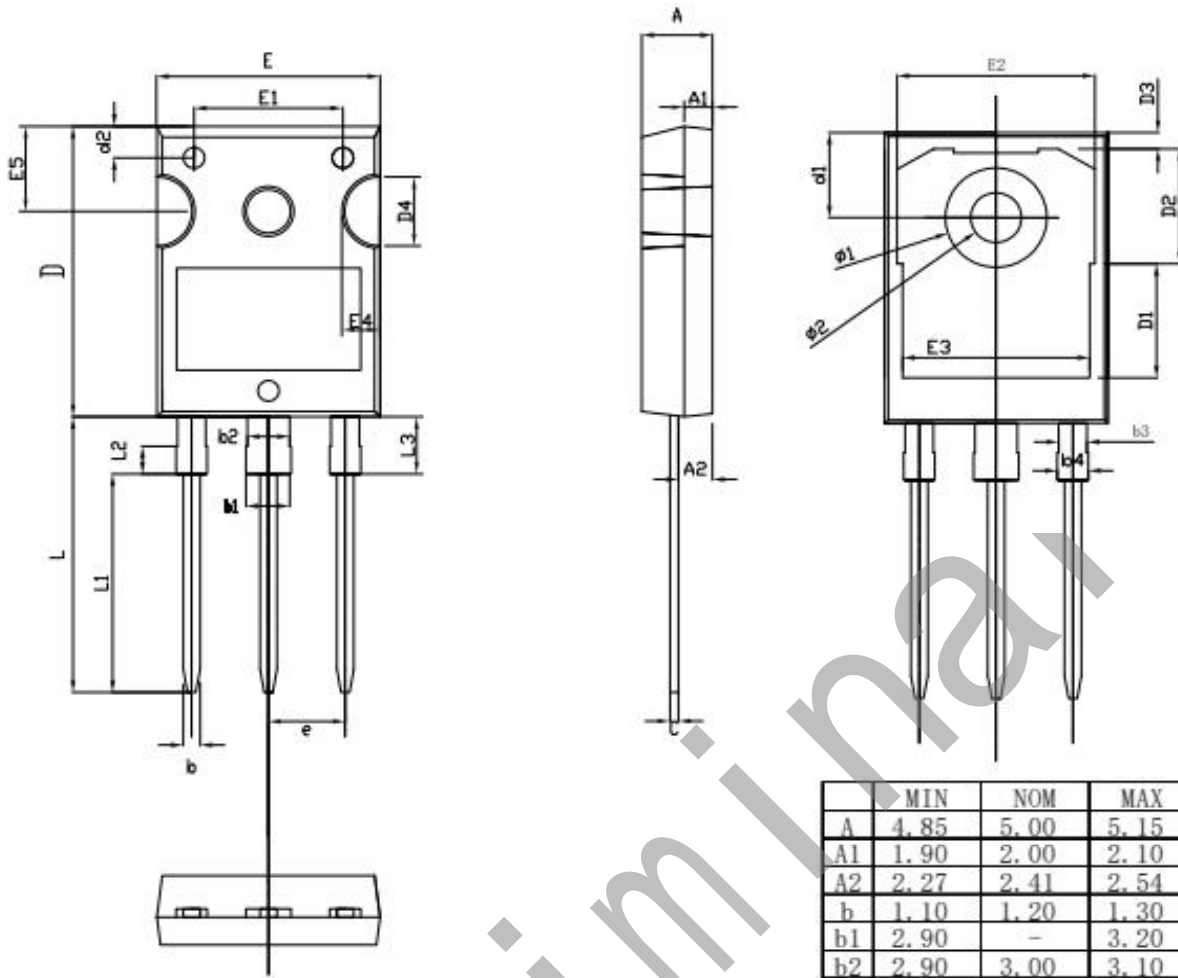
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



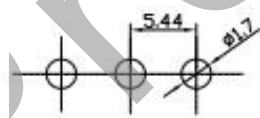
Diode Recovery Test Circuit & Waveforms



Package Outline: TO-247



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
ø1	7.10	7.19	7.30
ø2	3.50	3.60	3.70



**Revision History**

Revision	Date	Major changes
0.0	2021/6/24	Preliminary Revision

preliminary