SC040N120Y-R

Silicon Carbide MOSFET 1200V, 30mΩ, 60A

重庆平伟半导体股份有限公司

Features

- Low switching losses
- Extremely low on-resistance $R_{DS(on)}$
- Robust body diode operation under hard commutation events
- .XT interconnection technology for best-in-class thermal performance
- Qualified according to JEDEC criteria

Applications

- SMPS
- Solar PV inverters
- UPS
- EV charging infrastructure
- Energy storage and battery formation

100% DVDS Tested

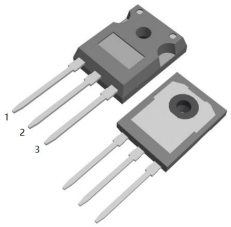
100%

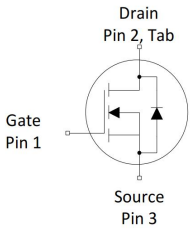
AvalancheTested

Product Summary

V_{DS}	1200V
$R_{DS(on)\ typ.}$	30mΩ
I_D	60A

TO-247-3L





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SC040N120Y-R	SC040N120Y	TO-247-3L	Tube	N/A	N/A	30pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current T_C = 25°C TC = 100°C	I_D	60 42	A
Pulsed drain current (T_C = 25°C)	$I_{D\ pulse}$	180	A
Avalanche energy, single pulse (L=5mH)	E_{AS}	331	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-10/+22	V
Recommended operating values	V_{GSsop}	-5/+18	V
Power dissipation T_C = 25°C	P_{tot}	208	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°C

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Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	R_{thJC}	-	0.48	0.7	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	R_{thJA}	-	-	50.0	°C/W	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	1200	-	-	V	V_{GS}=0V, I_D=100uA
Gate threshold voltage	$V_{GS(th)}$	2.2	2.8	4.2	V	V_{DS}=V_{GS}, I_D=10mA
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	V_{DS}=1200V,V_{GS}=0V T_j=25°C
Gate-source leakage current	I_{GSS}	-	-	200	nA	V_{GS}=22V,V_{DS}=0V
		-	-	-200	nA	V_{GS}=-10V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	30	40	mΩ	V_{GS}=18V,I_D=30A，T_J=25℃
Drain-source on-state resistance	$R_{DS(on)}$	-	63	-	mΩ	V_{GS}=18V,I_D=30A，T_J=175℃
Transconductance	g_{fs}	-	20.0	-	S	V_{DS}=20V,I_D=20A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	2959	-	pF	V_{GS}=0V, V_{DS}=1000V, f=1MHz
Output Capacitance	C_{oss}	-	118	-		
Reverse Transfer Capacitance	C_{rss}	-	6	-		
Gate Total Charge	Q_G	-	117	-	nC	V_{DS}=800V,I_D=33A ,V_{GS}=-5/18V
Gate-Source charge	Q_{gs}	-	38	-		
Gate-Drain charge	Q_{gd}	-	32	-		
Turn-on delay time	$t_{d(on)}$	-	44	-	ns	V_{GS}=-5/18V, V_{DD}=800V, R_G=5Ω,I_D=33A
Rise time	t_r	-	15	-		
Turn-off delay time	$t_{d(off)}$	-	37	-		
Fall time	t_f	-	14	-		
Gate resistance	R_G	-	2.8	-	Ω	V_{GS}=0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	- -	3.5 3.2	- -	V	V_{GS}=-5V, I_{SD}=20A T_j=25°C T_j=175°C
Body Diode Continuous Forward Current	I_S	-	60		A	T_C = 25°C
		-	42		A	T_C = 100°C
Body Diode Reverse Recovery Time	t_{rr}	-	32	-	ns	V_{GS}=15V,I_{SD}=33A, V_R=800V di/dt=1200A/us
Body Diode Reverse Recovery Charge	Q_{rr}	-	226	-	nC	
Peak Reverse Recovery Current	I_{RRM}	-	10.4	-	A	

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Typical Performance Characteristics

Fig 1: Output Characteristics Tj=25°C

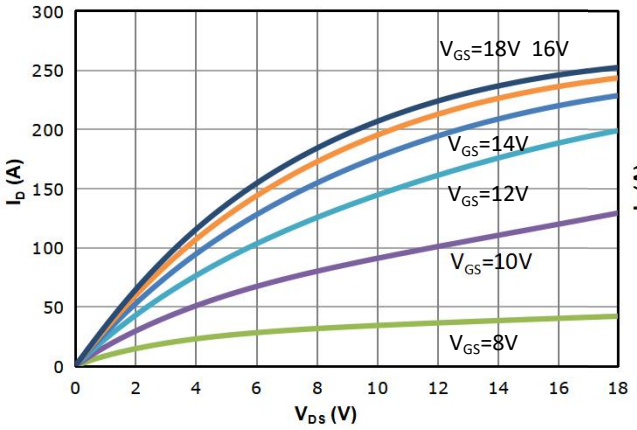


Fig 2: Output Characteristics Tj=175°C

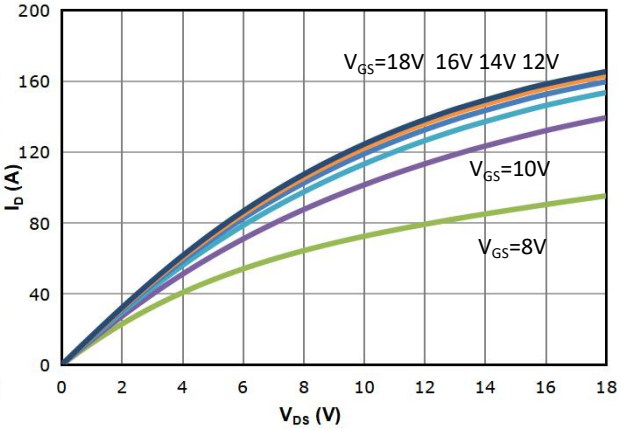


Fig 3: Transfer Characteristics

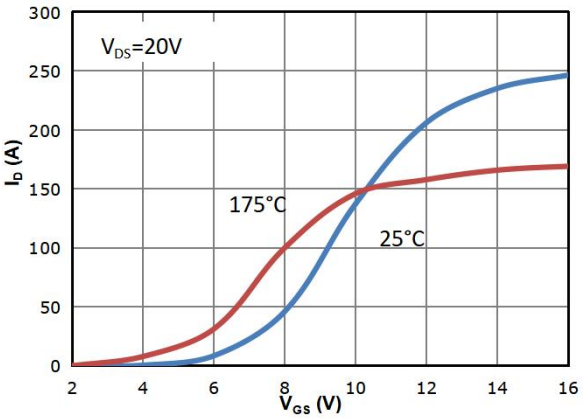


Fig 4: Rds(on) vs Drain Current and Gate Voltage

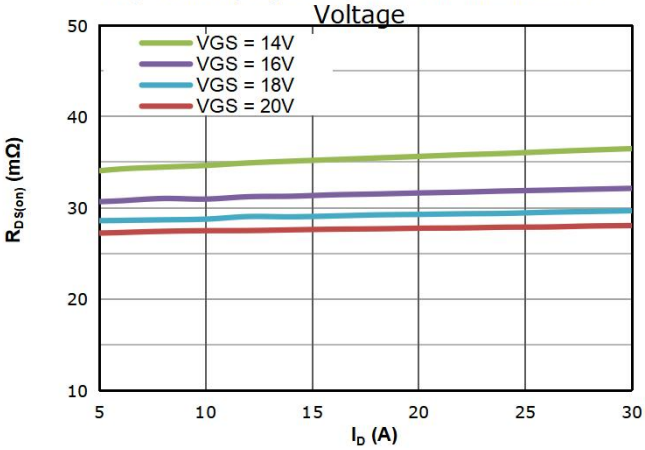


Fig 5: Rds(on) vs. Temperature

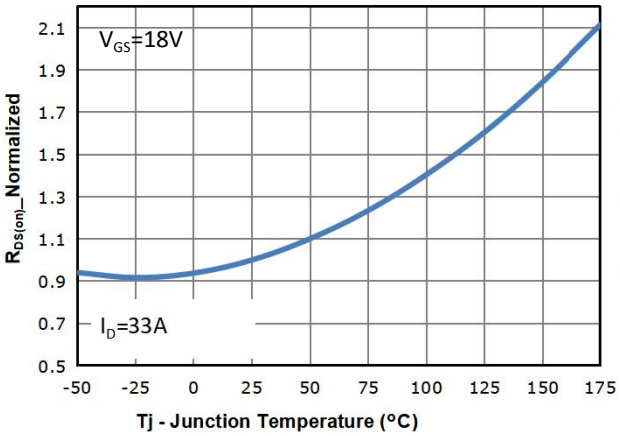
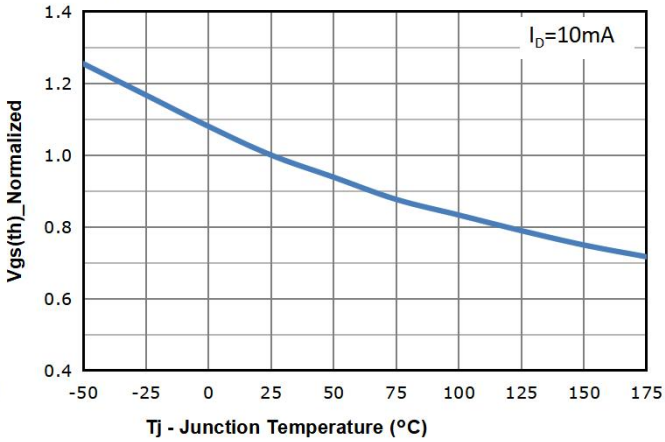


Fig 6: Vgs(th) vs. Temperature



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Fig 7: BVdss vs. Temperature

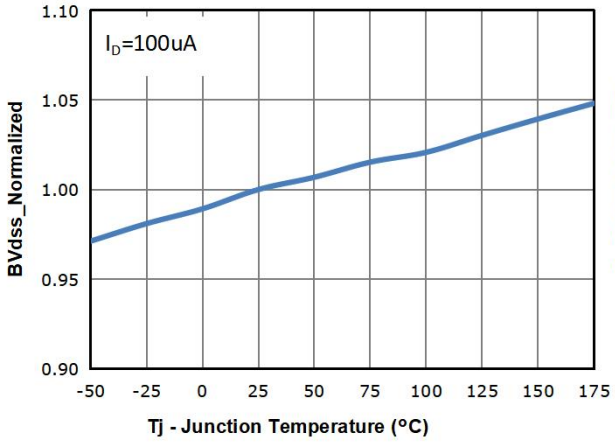


Fig 8: Capacitance Characteristics

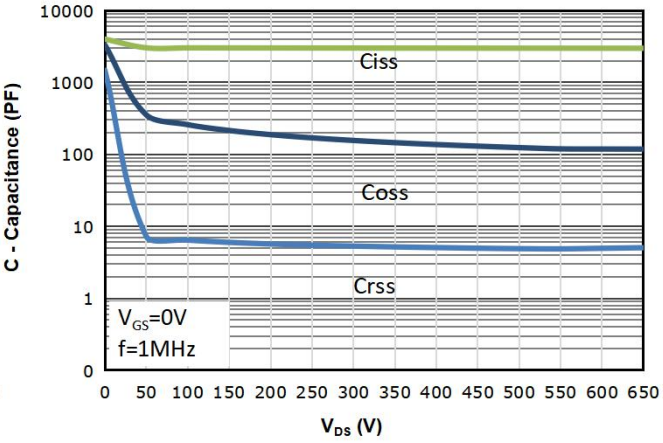


Fig 9: Gate ChargeCharacteristics

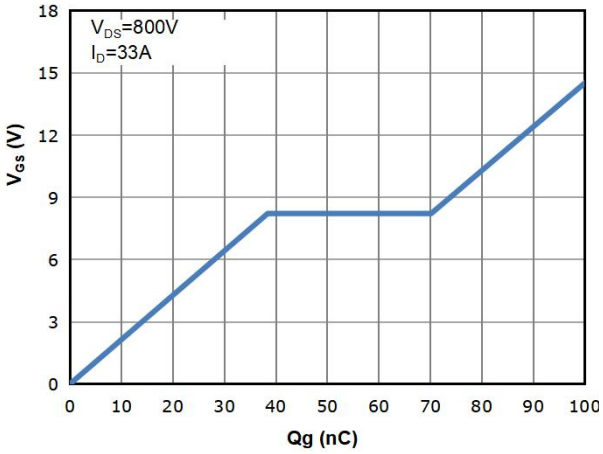


Fig 10: Body-diode Forward Characteristics

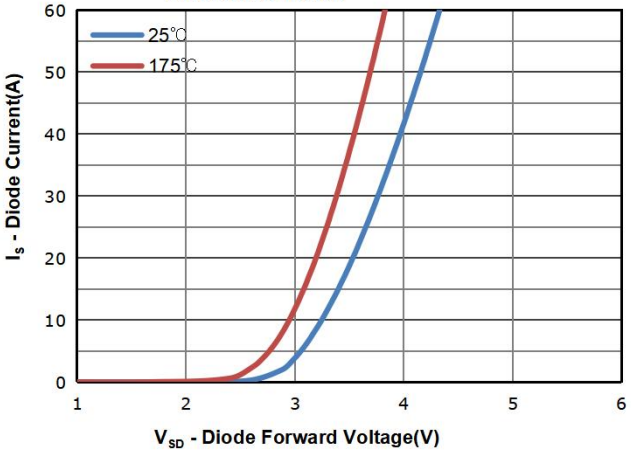


Fig 11: Power Dissipation

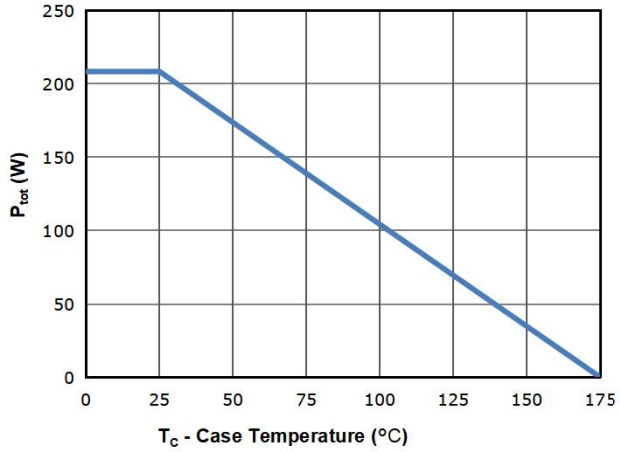
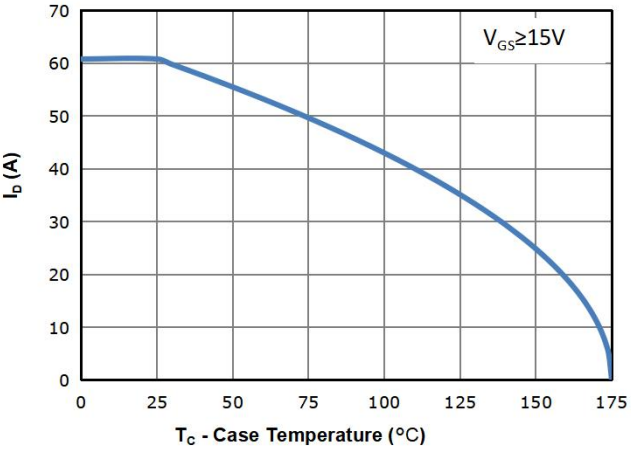


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

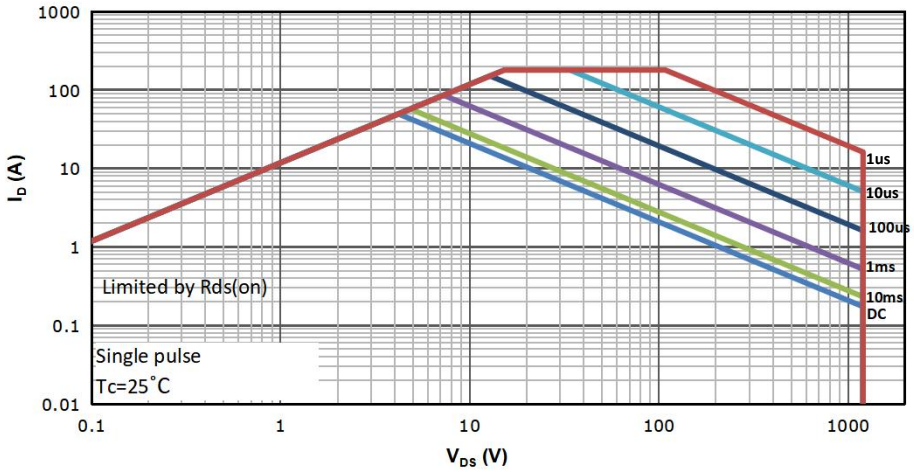
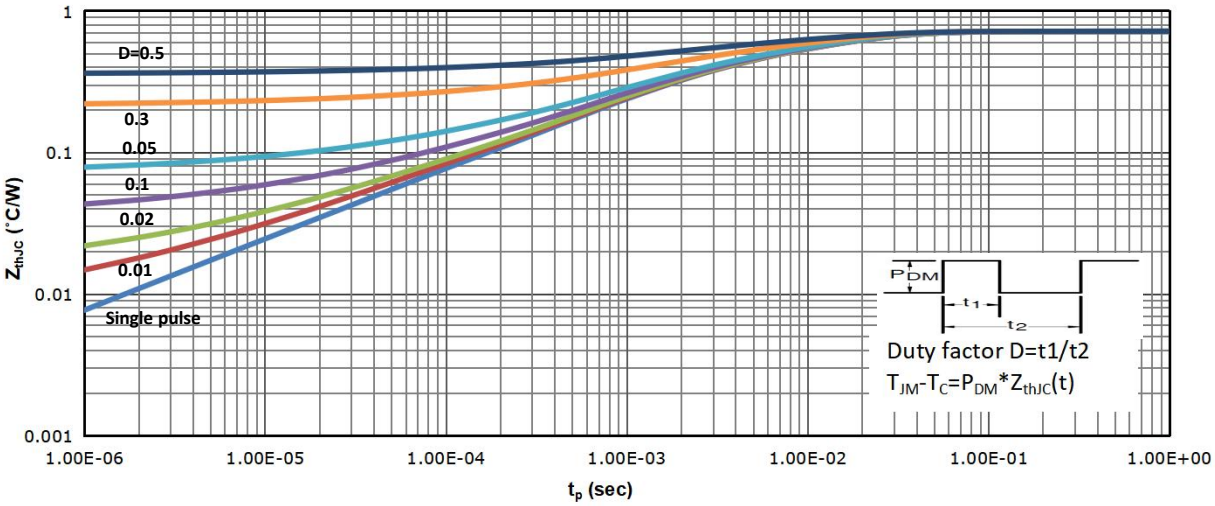


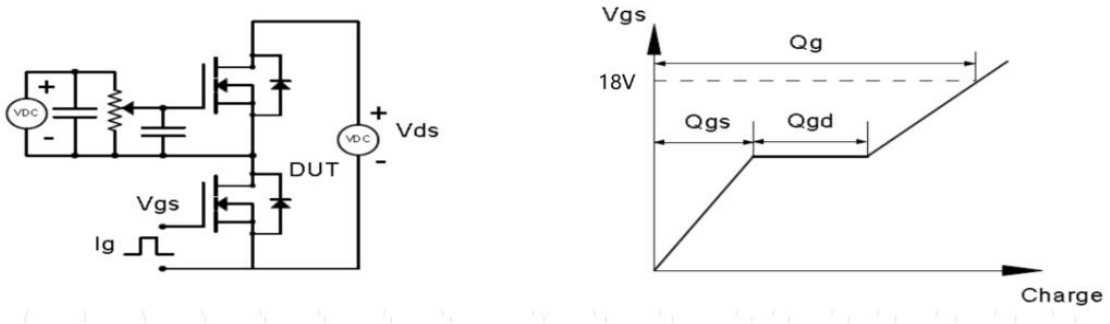
Fig 14: Max. Transient Thermal Impedance



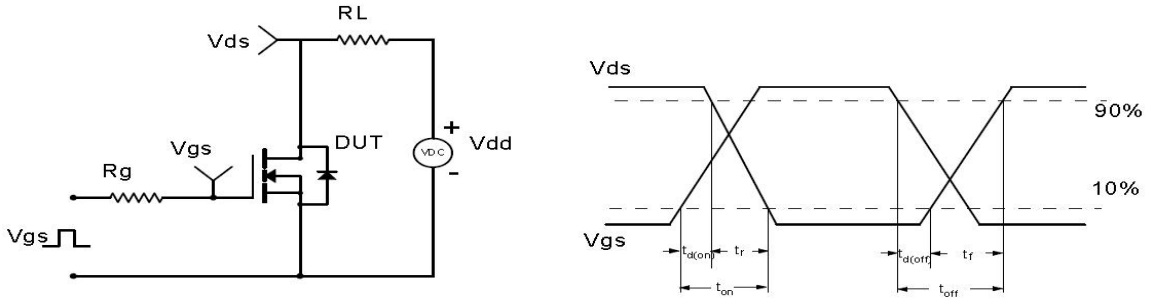
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Test Circuit & Waveform

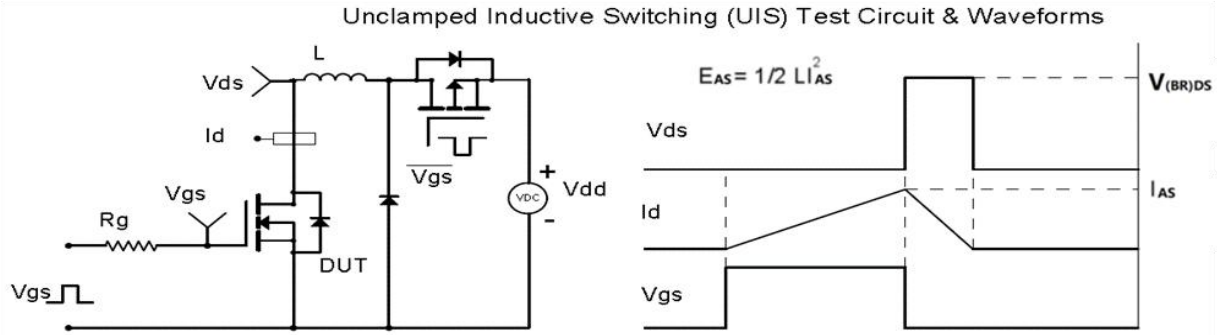
Gate Charge Test Circuit & Waveform



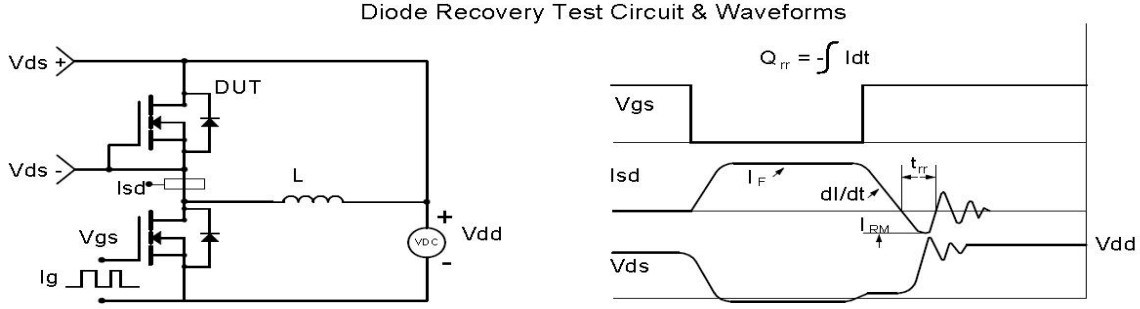
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

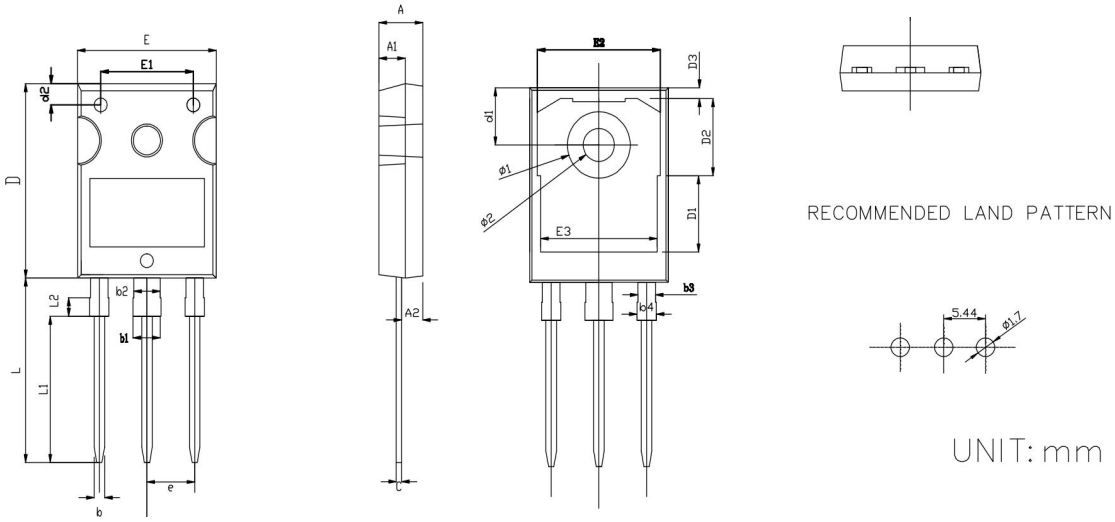


Diode Recovery Test Circuit & Waveforms



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Package Outline: TO-247-3L



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.20	0.189	0.205
A1	2.80	3.20	0.110	0.126
A2	2.26	2.56	0.089	0.101
b	1.10	1.30	0.043	0.051
b1	2.90	3.20	0.114	0.126
b2	2.90	3.10	0.114	0.122
b3	1.90	2.10	0.075	0.083
b4	2.00	2.20	0.079	0.087
c	0.50	0.70	0.020	0.028
D	20.80	21.20	0.819	0.835
D1	8.23		0.324	
D2	8.32		0.328	
D3	1.17		0.046	
d1	6.00	6.30	0.236	0.248
d2	2.20	2.40	0.087	0.094
E	15.60	16.00	0.614	0.630
E1	10.50		0.413	
E2	14.02		0.552	
E3	13.50		0.531	
e	5.34	5.54	0.210	0.218
L	19.72		0.776	
L1	15.79		0.622	
L2	1.98		0.078	
φ1	7.10	7.30	0.280	0.287
φ2	3.50	3.70	0.138	0.146

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