

SC018N120YM-R

Silicon Carbide MOSFET 1200V, 18mΩ, 106A



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
- Easy to Parallel and Simple to Drive
- Qualified according to JEDEC criteria

Applications

- On-board charger
- DC/DC converter
- Auxiliary inverters

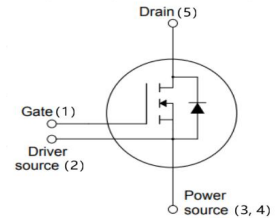
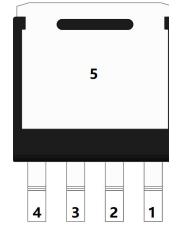
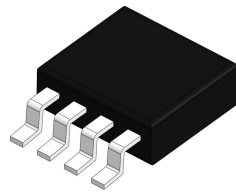


100% DVDS Tested
100% Avalanche Tested

Product Summary

V_{DS}	1200V
$R_{DS(on)}$ typ.	18mΩ
I_D	106A

TO-247SM



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SC018N120YM-R	SC018N120YM	TO-247SM	Tape&Reel	13inches	32mm	600pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current	I_D	106	A
$T_C = 25^\circ\text{C}$		160	
$T_C = 25^\circ\text{C}$ (Package limit)		75	
$T_C = 100^\circ\text{C}$ (Silicon limit)			
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D \text{ pulse}}$	285	A
Avalanche energy, single pulse ($L=5\text{mH}$)	E_{AS}	640	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-8/+22	V
Gate-Source voltage,Recommended operating values	V_{GSsop}	-5/+18	V
Power dissipation	P_{tot}	333	W
$T_C = 25^\circ\text{C}$			
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	R_{thJC}	-	0.3	0.45	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	R_{thJA}	-	-	50	°C/W	-

Electrical Characteristic (at $T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

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

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	1200	-	-	V	$V_{GS}=0V, I_D=100\mu A$
Gate threshold voltage	$V_{GS(th)}$	2.0	2.8	4.0	V	$V_{DS}=V_{GS}, I_D=20mA$
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	$V_{DS}=1200V, V_{GS}=0V$ $T_j=25^{\circ}C$ $T_j=175^{\circ}C$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=22V, V_{DS}=0V$
		-	-	-100	nA	$V_{GS}=-8V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	18	23	mΩ	$V_{GS}=18V, I_D=60A$
Transconductance	g_{fs}	-	41	-	S	$V_{DS}=20V, I_D=50A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	4817	-	pF	$V_{GS}=0V, V_{DS}=1000V,$ $f=300kHz$
Output Capacitance	C_{oss}	-	208	-		
Reverse Transfer Capacitance	C_{rss}	-	11	-		
Gate Total Charge	Q_G	-	203	-	nC	$V_{DS}=800V, I_D=40A$ $V_{GS}=-5V/18V$
Gate-Source charge	Q_{gs}	-	77	-		
Gate-Drain charge	Q_{gd}	-	46	-		
Turn-on delay time	$t_{d(on)}$	-	22	-	ns	$V_{GS}=-5/18V,$ $V_{DD}=800V,$ $R_G=5\Omega, I_D=60A$
Rise time	t_r	-	25	-		
Turn-off delay time	$t_{d(off)}$	-	43	-		
Fall time	t_f	-	14	-		
Gate resistance	R_G	-	1.3	-	Ω	$V_{GS}=0V, f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	3.7	-	V	$V_{GS} = -5V, I_{SD} = 60A$ $T_j = 25^{\circ}C$
		-	3.2	-		$T_j = 175^{\circ}C$
Body Diode Continuous Forward Current	I_S	-	-	119	A	$T_C = 25^{\circ}C$
		-	-	66	A	$T_C = 100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	23	-	ns	$V_{GS} = -5V, I_{SD} = 60A,$ $V_R = 800V$ $di/dt = 1000A/us$
Body Diode Reverse Recovery Charge	Q_{rr}	-	168	-	nC	
Peak Reverse Recovery Current	I_{RRM}	-	13	-	A	

Typical Performance Characteristics

Fig 1: Output Characteristics $T_j=25^\circ\text{C}$

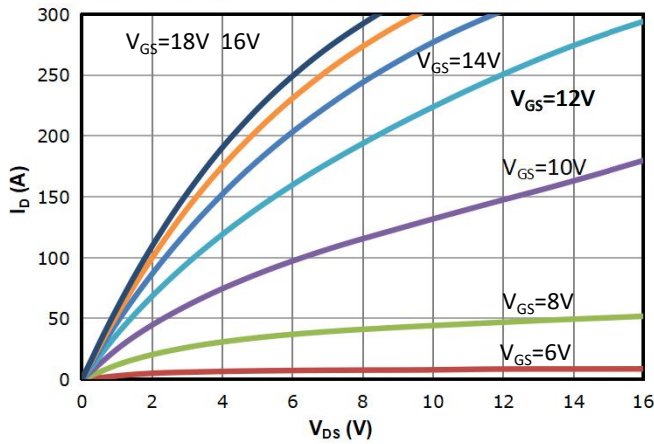


Fig 2: Output Characteristics $T_j=175^\circ\text{C}$

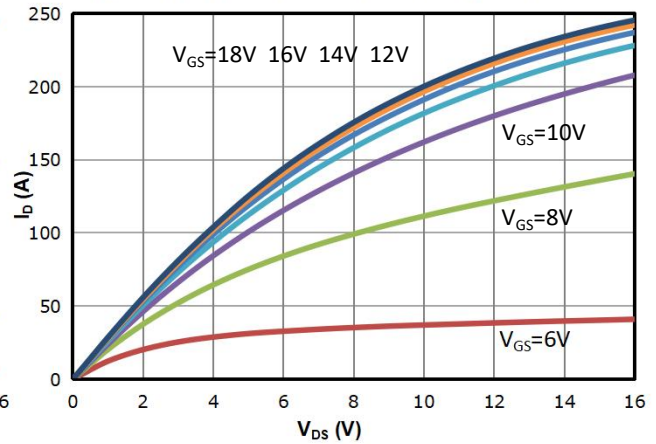


Fig 3: Transfer Characteristics

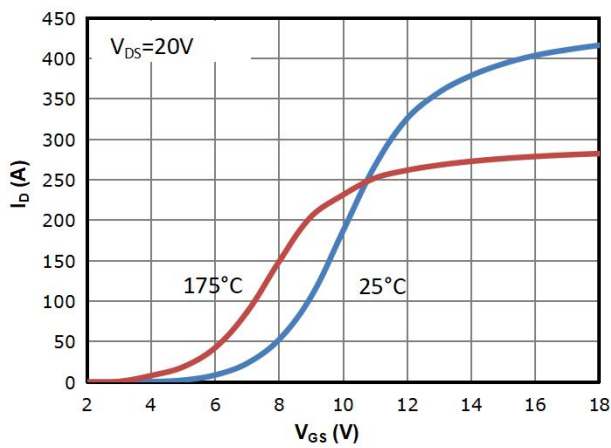


Fig 4: $R_{DS(on)}$ vs Drain Current and Gate Voltage

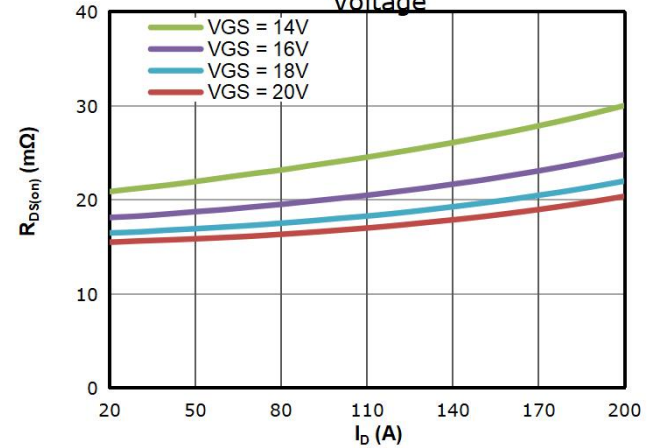


Fig 5: $R_{DS(on)}$ vs. Temperature

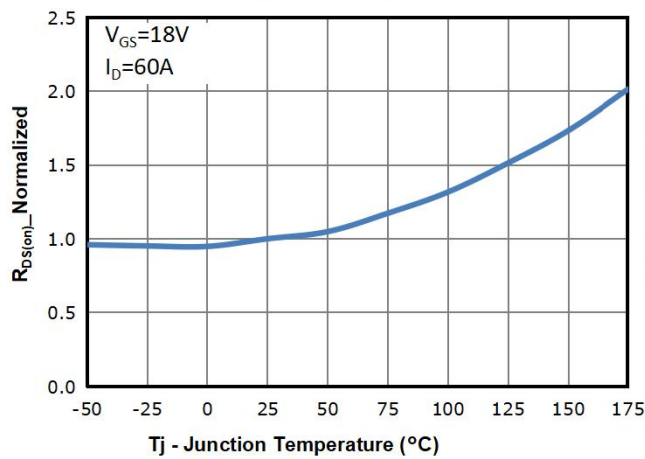


Fig 6: $V_{GS(th)}$ vs. Temperature

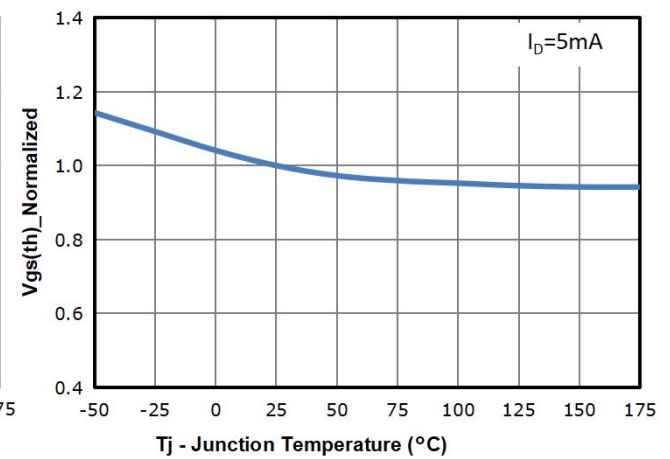


Fig 7: BVdss vs. Temperature

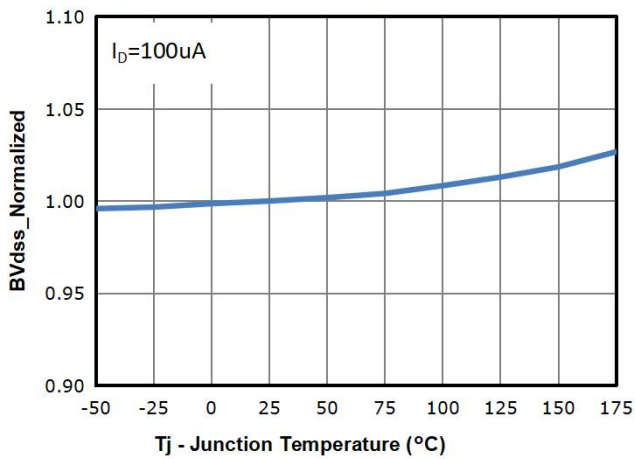


Fig 8: Capacitance Characteristics

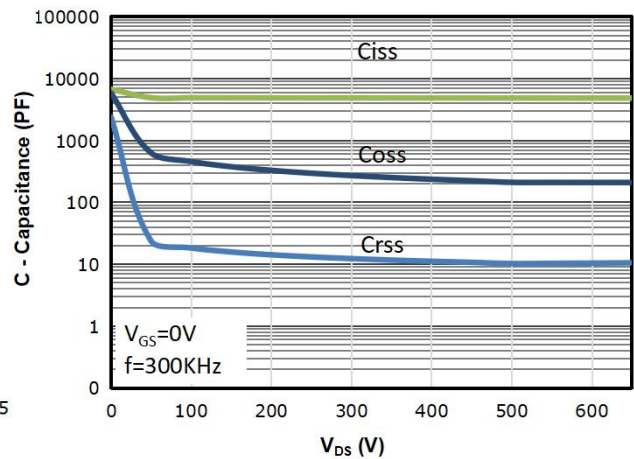


Fig 9: Gate Charge Characteristics

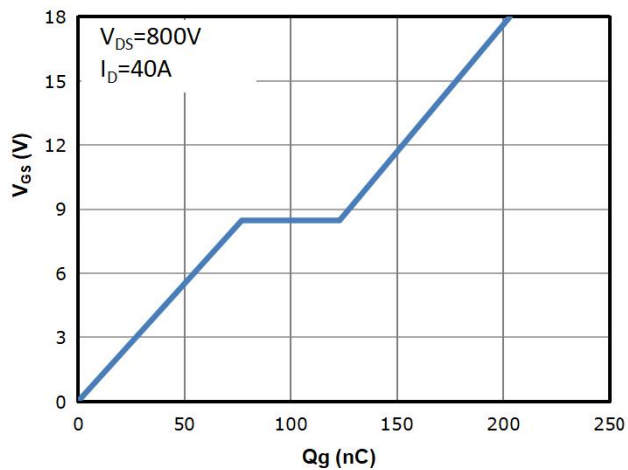


Fig 10: Body-diode Forward Characteristics

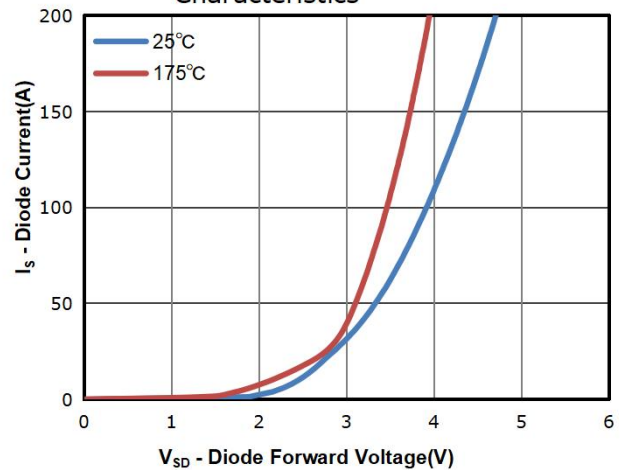


Fig 11: Power Dissipation

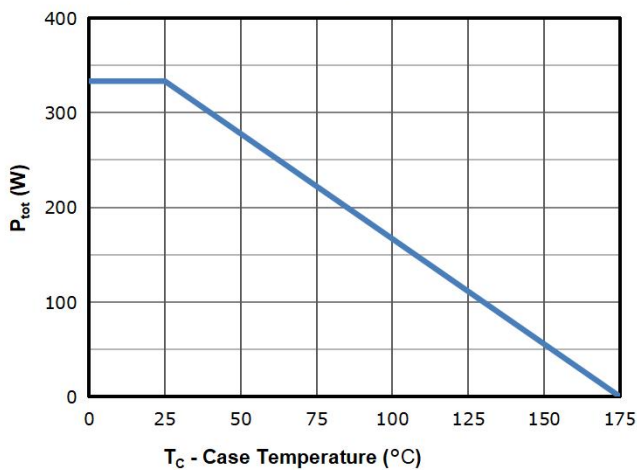


Fig 12: Drain Current Derating

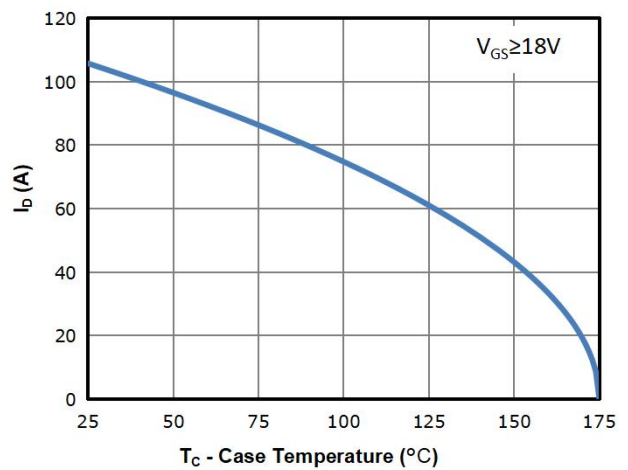


Fig 13: Safe Operating Area

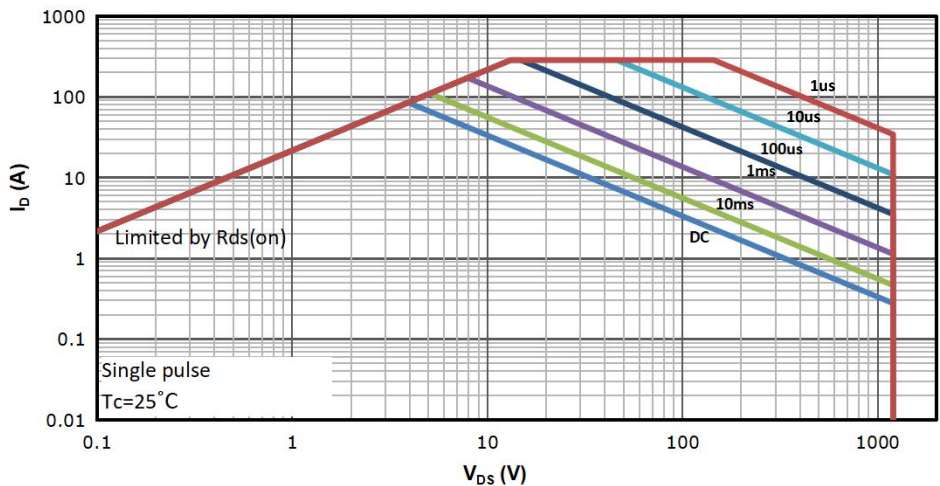
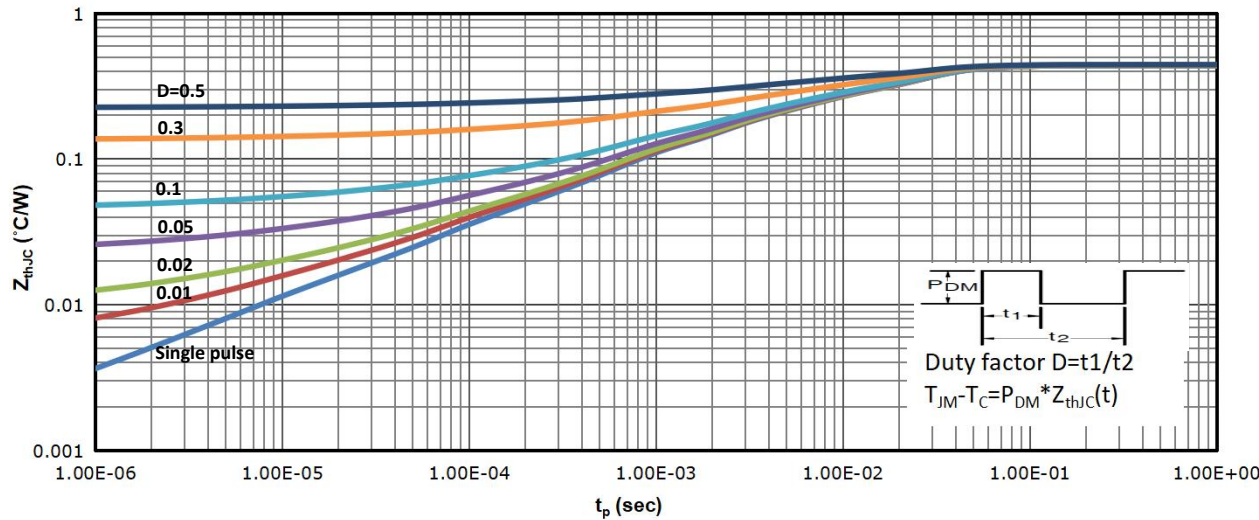
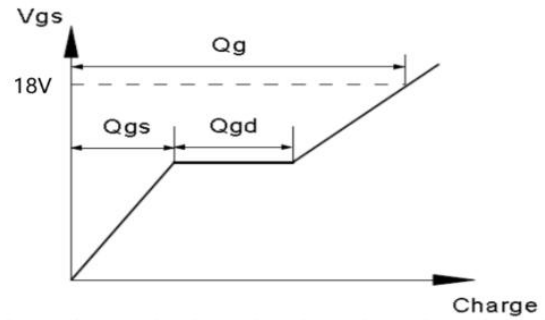
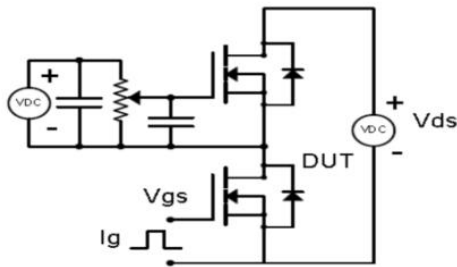


Fig 14: Max. Transient Thermal Impedance

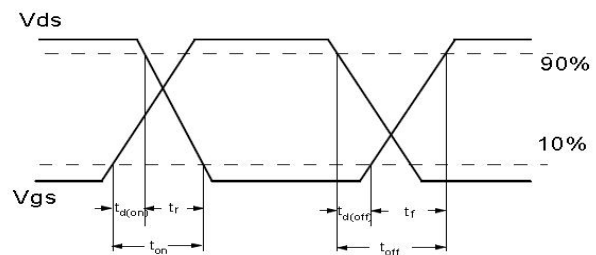
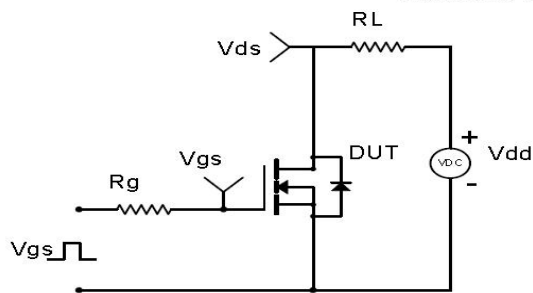


Test Circuit & Waveform

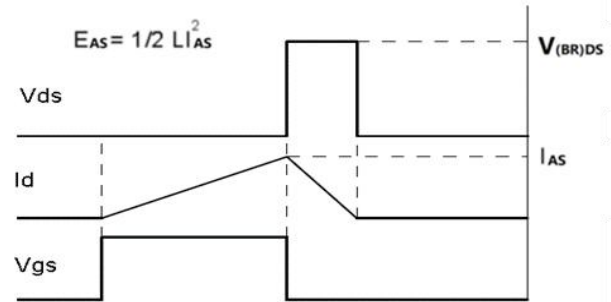
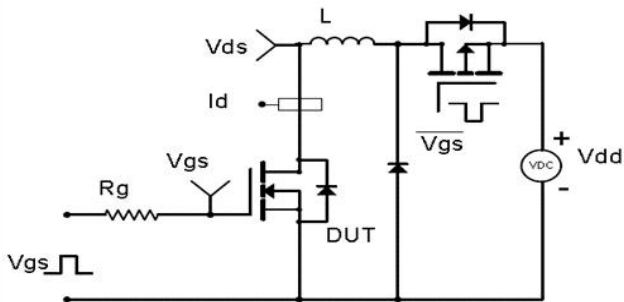
Gate Charge Test Circuit & Waveform



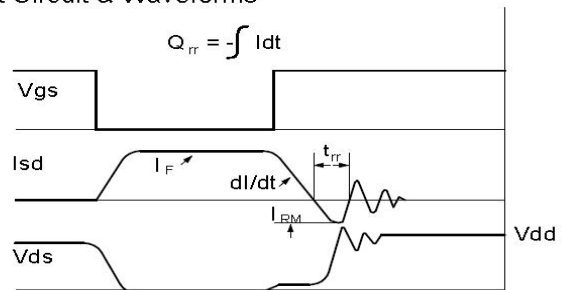
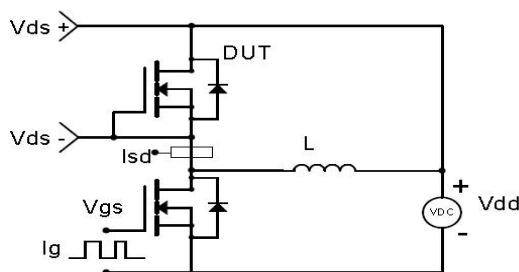
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



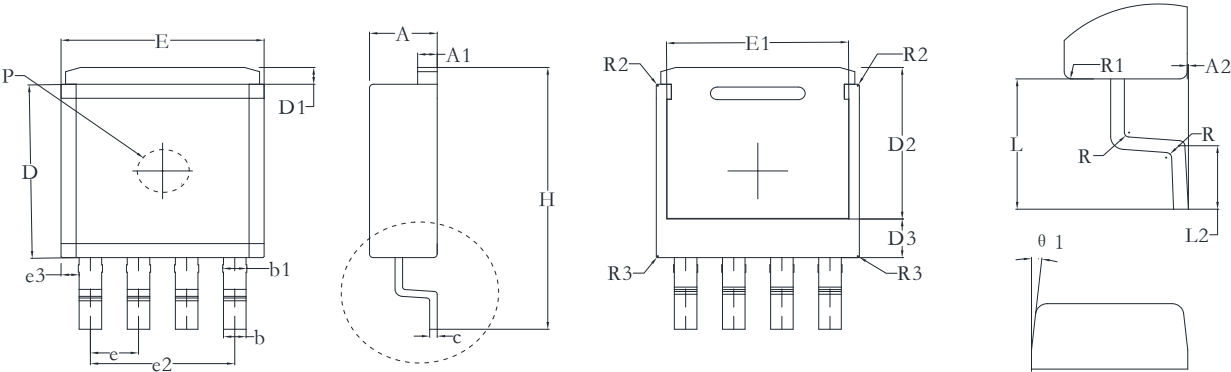
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Package Outline: TO-247SM



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.35	4.65	0.171	0.183
A1	1.20	1.40	0.047	0.055
b	1.45	1.55	0.057	0.061
b1	1.50	1.70	0.059	0.067
c	0.45	0.55	0.018	0.022
D	12.28	12.48	0.483	0.491
D1	1.10	1.30	0.043	0.051
D2	10.63	10.83	0.419	0.426
E	13.40	13.60	0.528	0.535
E1	12.00	12.20	0.472	0.480
e	3.16	3.24	0.124	0.128
e2	9.45	9.75	0.372	0.384
e3	1.16	1.24	0.046	0.049
H	18.40	19.00	0.724	0.748
L	4.82	5.42	0.190	0.213
L2	1.70	2.30	0.067	0.091
R	0.35	0.65	0.014	0.026
θ1	6°	10°	6°	10°
P	2.85	3.15	0.112	0.124
D3	2.65	2.95	0.104	0.116
A2	0.10	0.20	0.004	0.008
R1	0.75	0.85	0.030	0.033
R2	0.15	0.25	0.006	0.010
R3	0.05	0.15	0.002	0.006

Disclaimer

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The product is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation/aerospace and life-support devices or systems.

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