

SC500N65ZG

Silicon Carbide MOSFET 650V, 500mΩ, 8A



重庆平伟半导体股份有限公司

Features

- 0 V turn-off gate voltage can be applied
- High Blocking Voltage with Low RDS(on)
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Qualified according to JEDEC criteria



Applications

- Lighting
- Telecom and UPS
- PWM stages for e.g. PC Silverbox, Adapter, LCD & PDP TV

100% DVDS Tested

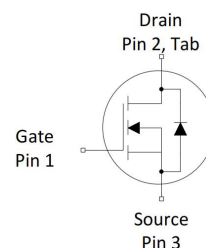
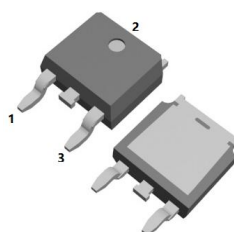
100%

Avalanche Tested

Product Summary

V_{DS}	650V
$R_{DS(on)}$ typ.	500mΩ
I_D	8A

TO-252



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SC500N65ZG	SC500N65ZG	TO-252	Tape&Reel	13 inches	16mm	2500

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	8 6	A
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D \text{ pulse}}$	23	A
Avalanche energy, single pulse ($L=5\text{mH}$)	E_{AS}	10	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-10/+22	V
Recommended operating values	V_{GSop}	0/+18	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	29	W
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}	-	3.5	5.2	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	R_{thJA}	-	-	50	°C/W	1 inch ² , 2oz single copper FR-4 PCB.

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

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

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	$V_{GS}=0V, I_D=100\mu A$
Gate threshold voltage	$V_{GS(th)}$	2.2	3.1	4.2	V	$V_{DS}=V_{GS}, I_D=1mA$
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	$V_{DS}=650V, V_{GS}=0V$ $T_j=25^\circ C$
		-	-	100		$T_j=175^\circ C$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=22V, V_{DS}=0V$
		-	-	-100	nA	$V_{GS}=-10V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	500	600	mΩ	$V_{GS}=15V, I_D=2.5A$
Drain-source on-state resistance	$R_{DS(on)}$	-	410	500	mΩ	$V_{GS}=18V, I_D=2.5A$
Transconductance	g_{fs}	-	1.9	-	S	$V_{DS}=20V, I_D=2.5A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	139	-	pF	$V_{GS}=0V, V_{DS}=400V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	13	-		
Reverse Transfer Capacitance	C_{rss}	-	2	-		
Gate Total Charge	Q_G	-	8	-	nC	$V_{DS}=400V, I_D=2.5A$ $V_{GS}=0V/18V$
Gate-Source charge	Q_{gs}	-	2	-		
Gate-Drain charge	Q_{gd}	-	3	-		
Turn-on delay time	$t_{d(on)}$	-	18	-	ns	$V_{GS}=0/18V, V_{DD}=200V,$ $R_G=10\Omega, I_D=2.5A$
Rise time	t_r	-	5	-		
Turn-off delay time	$t_{d(off)}$	-	25	-		
Fall time	t_f	-	7	-		
Gate resistance	R_G	-	25.6	-	Ω	$V_{GS}=0V, f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	- -	4.4 4.0	- -	V	$V_{GS} = -5V, I_{SD} = 1.25A$ $T_j = 25^{\circ}C$ $T_j = 175^{\circ}C$
Body Diode Continuous Forward Current	I_S	-	-	8	A	$T_C = 25^{\circ}C$
		-	-	5	A	$T_C = 100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	65	-	ns	$V_{GS} = -5V, I_{SD} = 2.5A,$ $V_R = 200V$ $di/dt = 1000A/us$
Body Diode Reverse Recovery Charge	Q_{rr}	-	40	-	nC	
Peak Reverse Recovery Current	I_{RRM}	-	1	-	A	

Typical Performance Characteristics

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

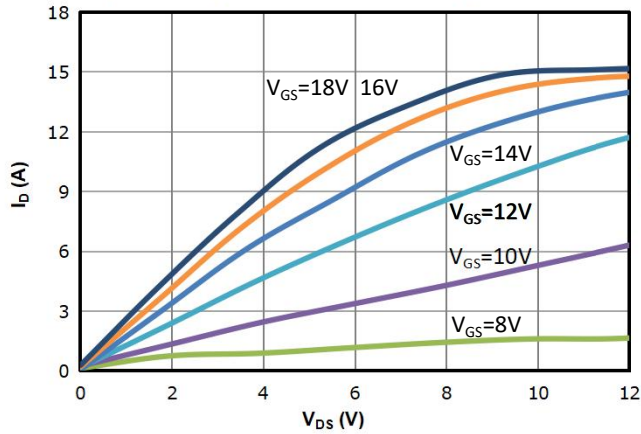


Fig 2: Output Characteristics $T_j=175^{\circ}\text{C}$

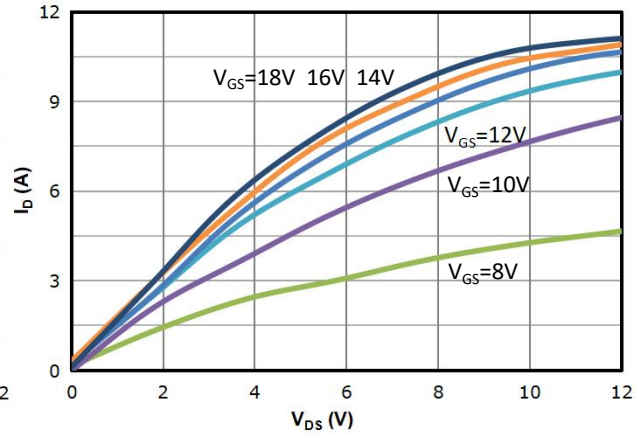


Fig 3: Transfer Characteristics

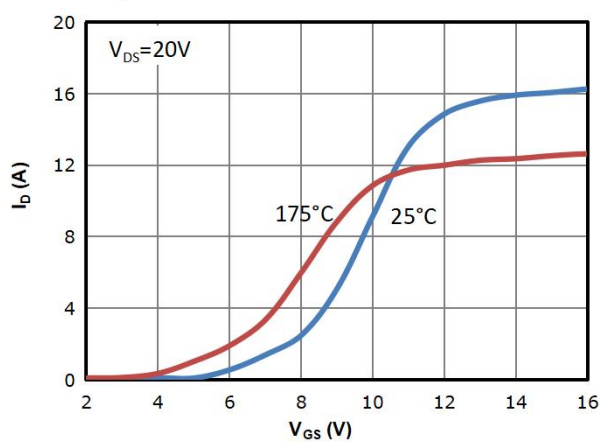


Fig 4: $R_{DS(on)}$ vs Drain Current and Gate Voltage

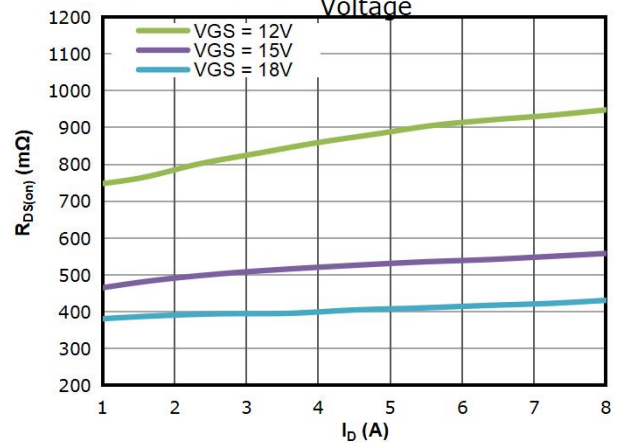


Fig 5: $R_{DS(on)}$ vs. Temperature

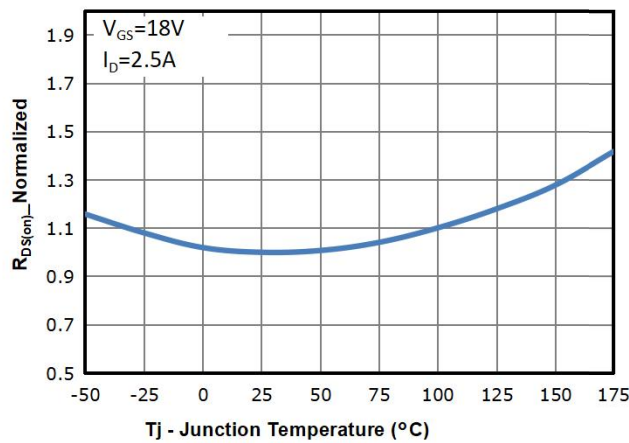


Fig 6: $V_{GS(th)}$ vs. Temperature

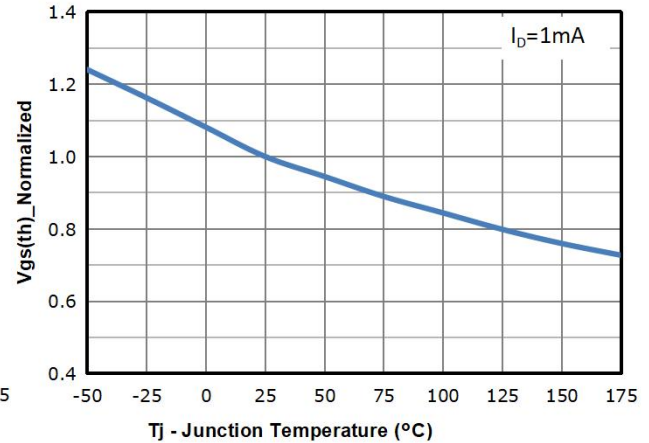


Fig 7: BVdss vs. Temperature

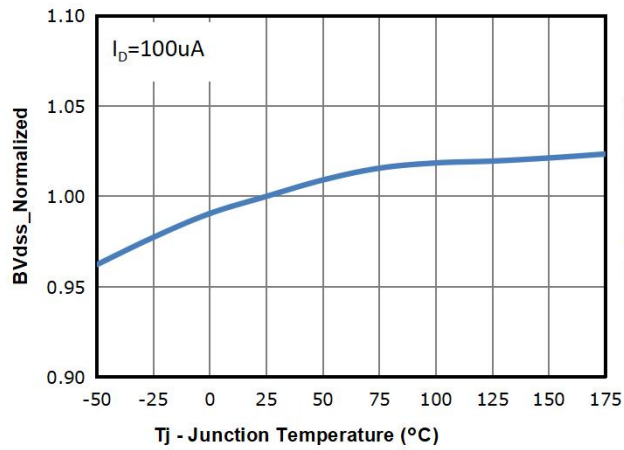


Fig 8: Capacitance Characteristics

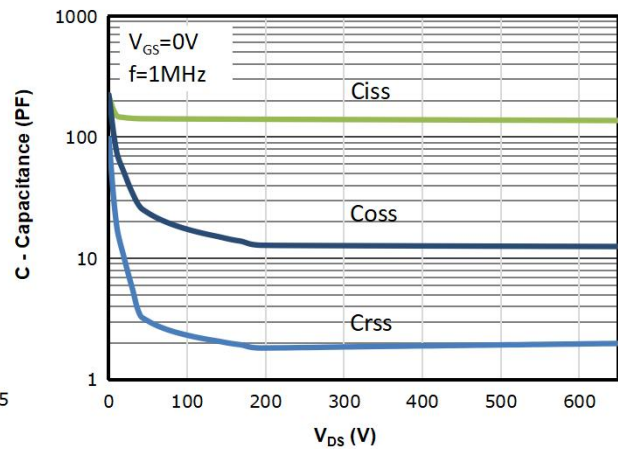


Fig 9: Gate Charge Characteristics

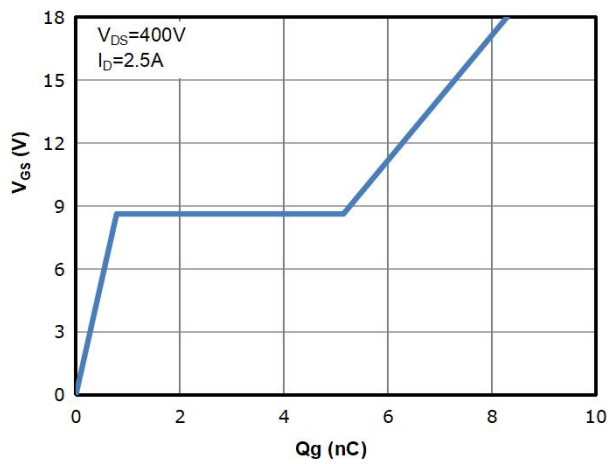


Fig 10: Body-diode Forward Characteristics

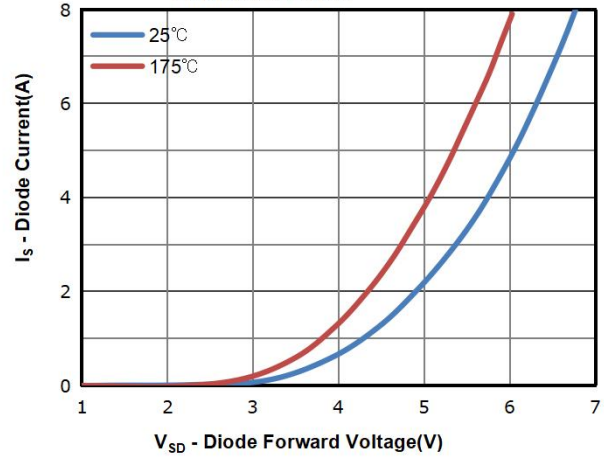


Fig 11: Power Dissipation

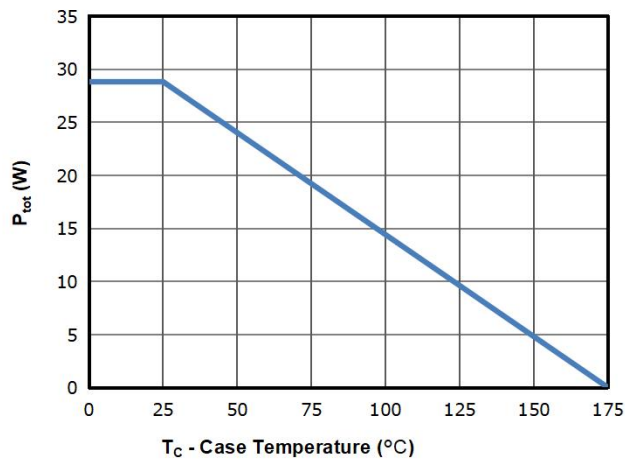


Fig 12: Drain Current Derating

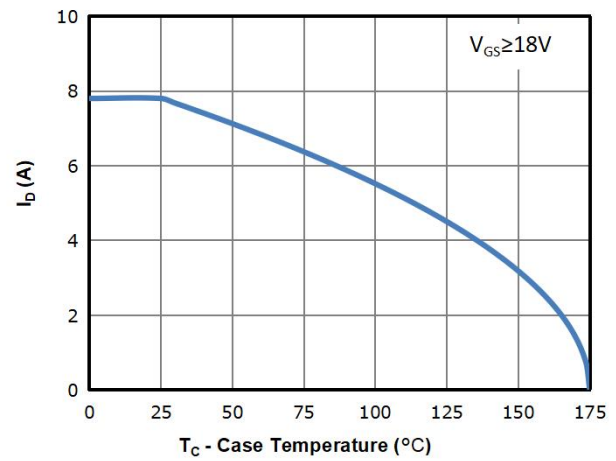


Fig 13: Safe Operating Area

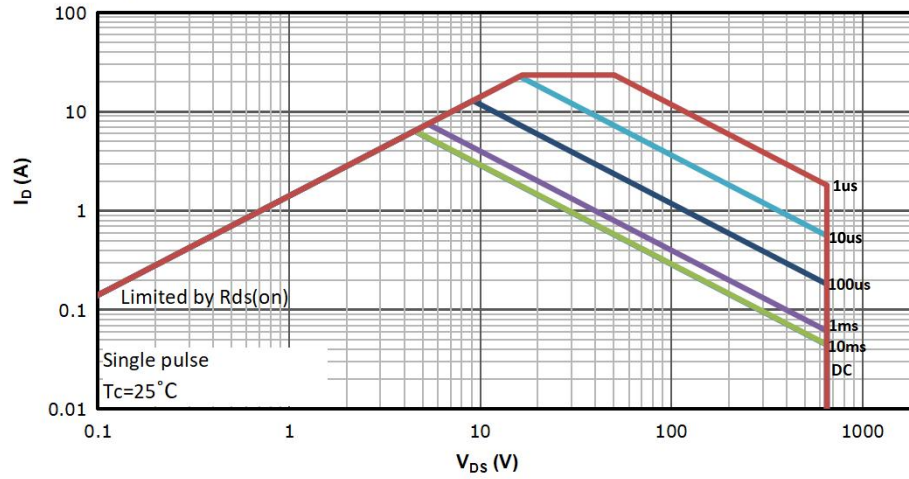
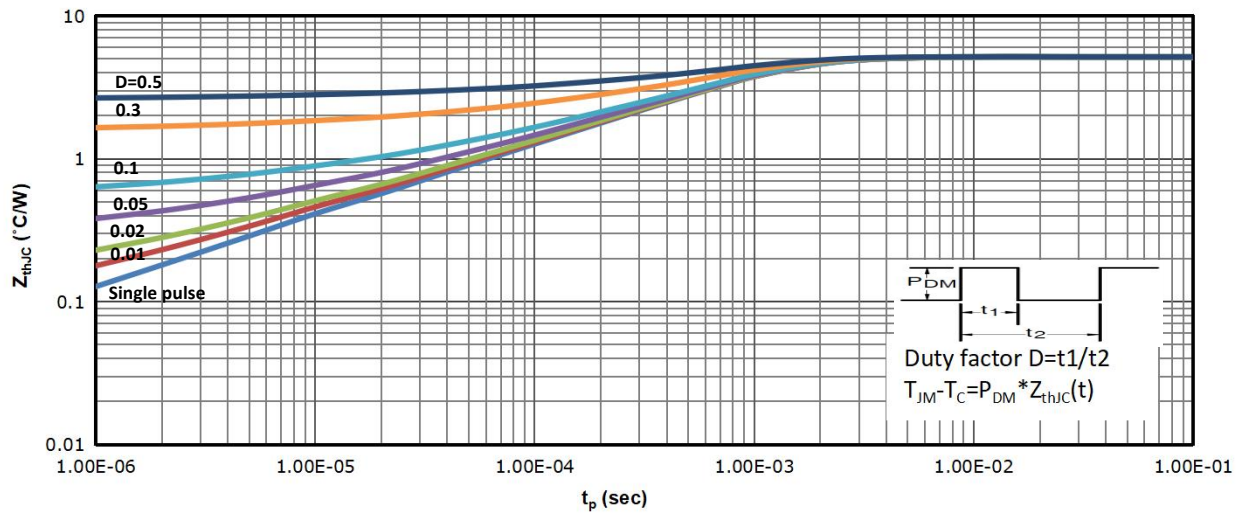
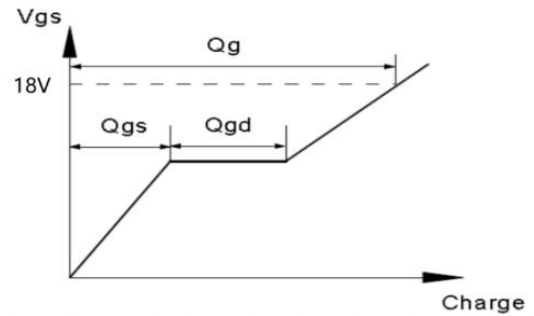
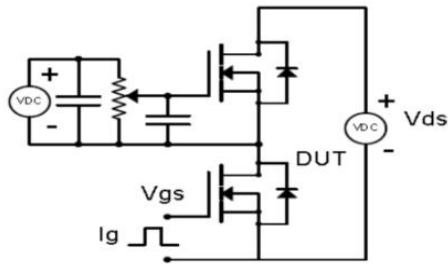


Fig 14: Max. Transient Thermal Impedance

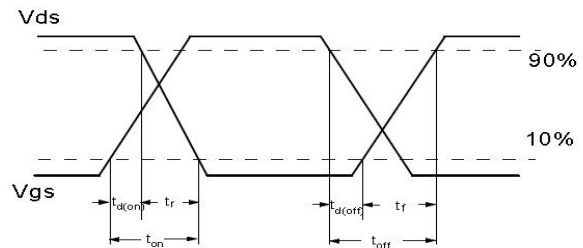
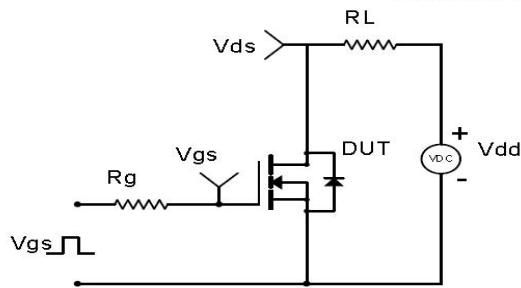


Test Circuit & Waveform

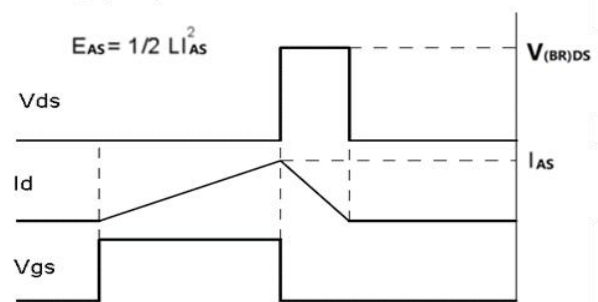
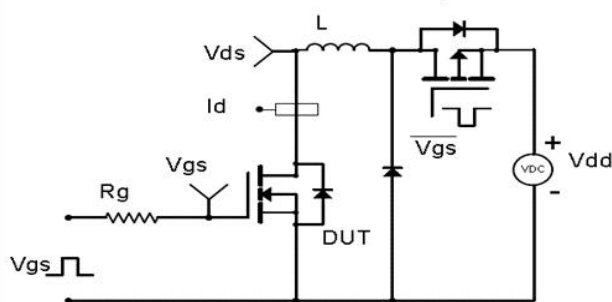
Gate Charge Test Circuit & Waveform



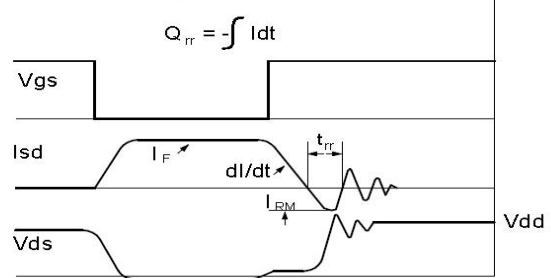
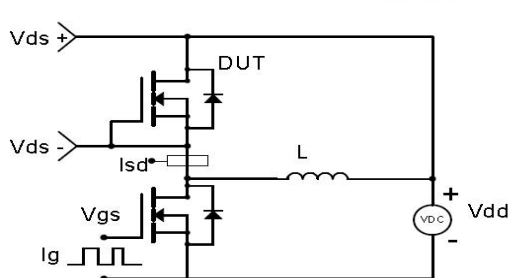
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



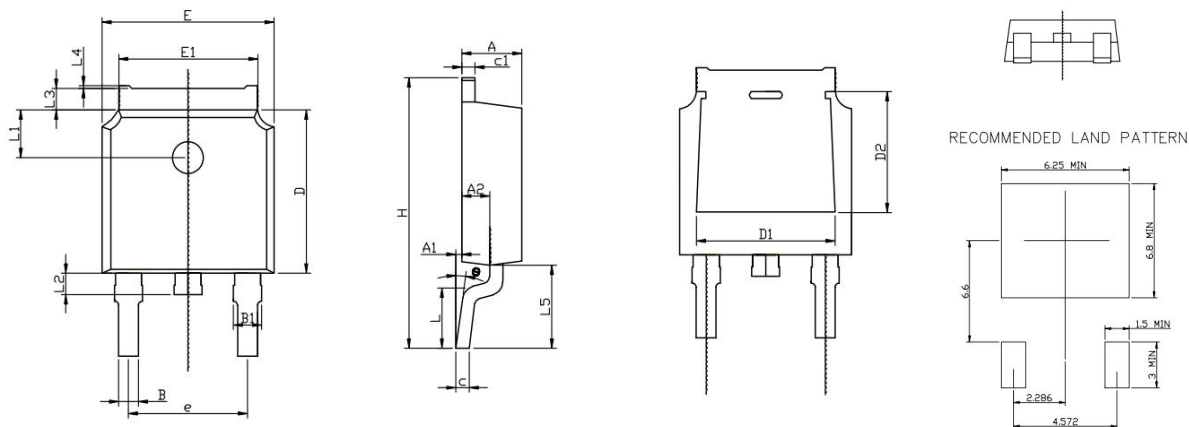
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Package Outline: TO-252



UNIT: mm

SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.15	2.45	0.085	0.096
A1	0.05	0.20	0.002	0.008
A2	0.91	1.22	0.036	0.048
B	0.66	0.86	0.026	0.034
B1	0.93	1.23	0.037	0.048
C	0.40	0.60	0.016	0.024
C1	0.40	0.60	0.016	0.024
D	5.95	6.25	0.234	0.246
D1	4.80		0.189	
D2	3.80		0.150	
E	6.45	6.75	0.254	0.266
E1	5.12	5.52	0.202	0.217
L	1.65		0.065	
L1	1.58	1.98	0.062	0.078
L2	0.60	1.00	0.024	0.039
L3	0.70	1.00	0.028	0.039
L4	0.00	0.20	0.000	0.008
L5	2.80	3.40	0.110	0.134
H	9.80	10.40	0.386	0.409
θ	0.00	8.00	0.000	0.315
e	4.57		0.180	

Disclaimer

Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

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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