

PWS1G420N105PZ

Silicon Carbide MOSFET 1050V, 420mΩ, 6A



重庆平伟半导体股份有限公司

Features

- 0V 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

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

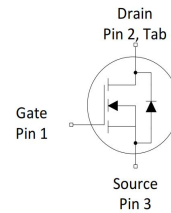
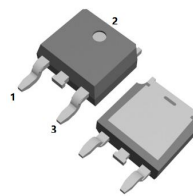


100% DVDS Tested
100%
Avalanche Tested

Product Summary

V_{DS}	1050V
$R_{DS(on)}$ typ.	420mΩ
I_D	6A

TO-252-2L



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
PWS1G420N105PZ	S1420N105PZ	TO-252-2L	Tape&Reel	13 inches	16mm	2500

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1050	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_D	6 4	A
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D \text{ pulse}}$	19	A
Avalanche energy, single pulse ($L=5\text{mH}$)	E_{AS}	16	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-10/+22	V
Recommended operating values	V_{GSsop}	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}	-	3.45	5.2	°C/W	-
Thermal resistance, junction - ambient(min.)	R_{thJA}	-	-	50.0	°C/W	1 inch ² , 2oz single copper FR-4 PCB

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

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

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	1050	-	-	V	$V_{GS}=0V, I_D=500\mu A$
Gate threshold voltage	$V_{GS(th)}$	2.6	3.6	4.6	V	$V_{DS}=V_{GS}, I_D=1.3mA$
Zero gate voltage drain current	I_{DSS}	-	-	10	μA	$V_{DS}=1050V, V_{GS}=0V$ $T_j=25\text{ °C}$
Gate-source leakage current	I_{GSS}	-	-	250	nA	$V_{GS}=22V, V_{DS}=0V$
		-	-	-200	nA	$V_{GS}=-10V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	420	525	mΩ	$V_{GS}=18V, I_D=3A, T_j=25\text{ °C}$
Drain-source on-state resistance	$R_{DS(on)}$	-	540	-	mΩ	$V_{GS}=15V, I_D=3A, T_j=25\text{ °C}$
Transconductance	g_{fs}	-	1.8	-	S	$V_{DS}=20V, I_D=3A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	193	-	pF	$V_{GS}=0V, V_{DS}=50V, f=1MHz$
Output Capacitance	C_{oss}	-	40	-		
Reverse Transfer Capacitance	C_{rss}	-	4	-		
Gate Total Charge	Q_G	-	8	-	nC	$V_{DS}=600V, I_D=6A$ $V_{GS}=0/18V$
Gate-Source charge	Q_{gs}	-	3	-		
Gate-Drain charge	Q_{gd}	-	4	-		
Turn-on delay time	$t_{d(on)}$	-	84	-	ns	$V_{GS}=0/18V, V_{DD}=600V,$ $R_G=10\Omega, I_D=6A$
Rise time	t_r	-	19	-		
Turn-off delay time	$t_{d(off)}$	-	11	-		
Fall time	t_f	-	22	-		
Turn-on energy	E_{on}	-	36	-	μJ	
Turn-off energy	E_{off}	-	35	-		
Gate resistance	R_G	-	8.9	-	Ω	$V_{GS}=0V, f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	4.5	-	V	$V_{GS} = -5V, I_{SD} = 2.1A$
		-	4	-		$T_j = 25^{\circ}C$ $T_j = 175^{\circ}C$
Body Diode Continuous Forward Current	I_S	-	6		A	$T_C = 25^{\circ}C$
		-	4		A	$T_C = 100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	17	-	ns	$V_{GS} = 0/18V, I_{SD} = 6A,$ $V_R = 600V$ $di/dt = 1200A/us$
Body Diode Reverse Recovery Charge	Q_{rr}	-	34	-	nC	
Peak Reverse Recovery Current	I_{RRM}	-	3.0	-	A	

Typical Performance Characteristics

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

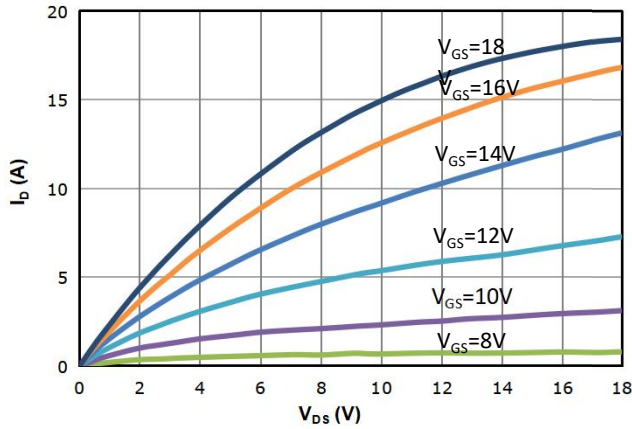


Fig 2: Output Characteristics $T_j=175^\circ\text{C}$

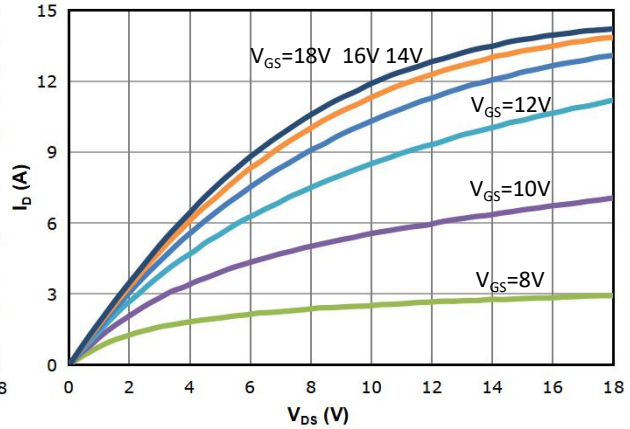


Fig 3: Transfer Characteristics

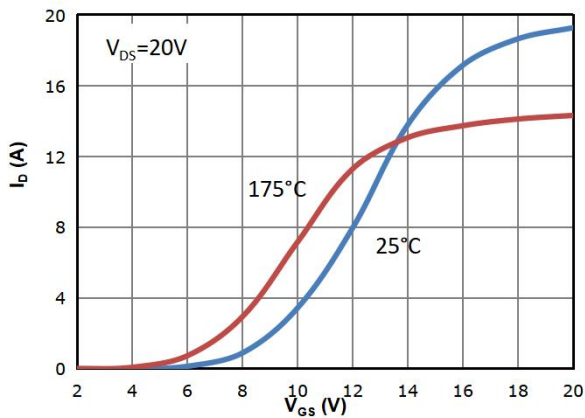


Fig 4: $R_{ds(on)}$ vs Drain Current and Gate Voltage

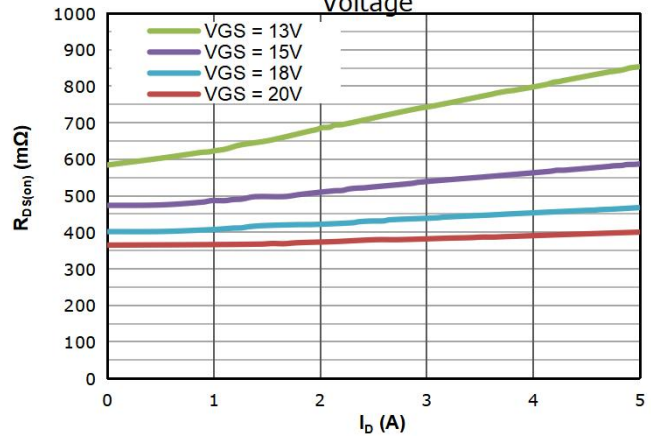


Fig 5: $R_{ds(on)}$ vs. Temperature

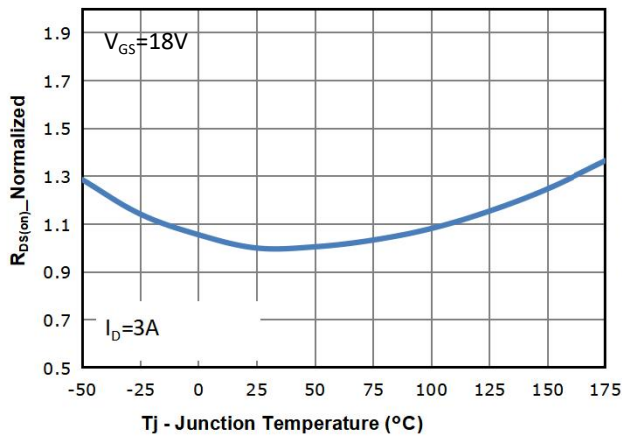


Fig 6: $V_{gs(th)}$ vs. Temperature

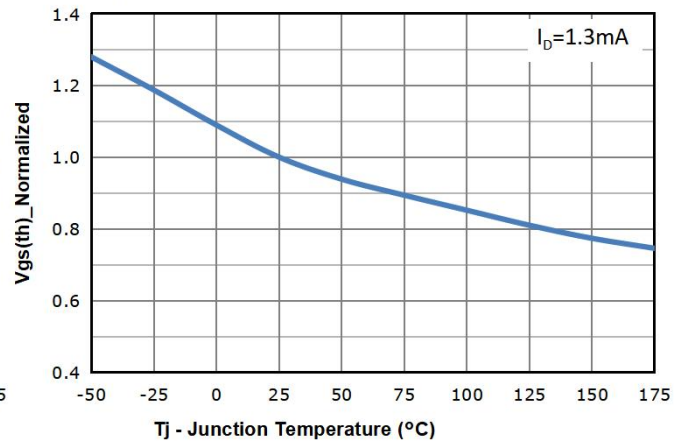


Fig 7: BVdss vs. Temperature

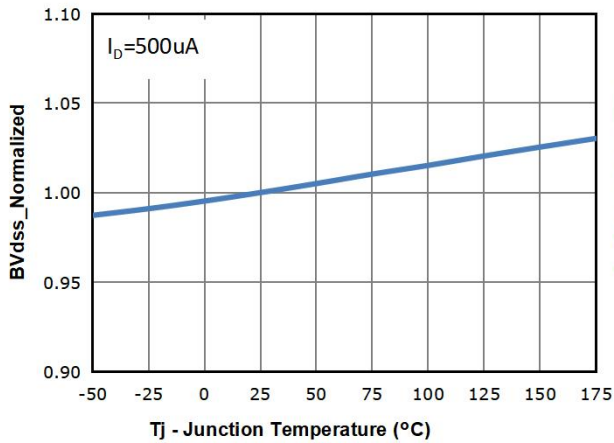


Fig 8: Capacitance Characteristics

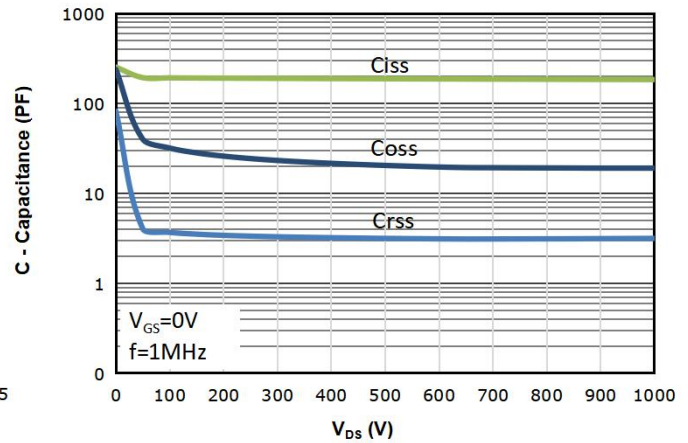


Fig 9: Gate Charge Characteristics

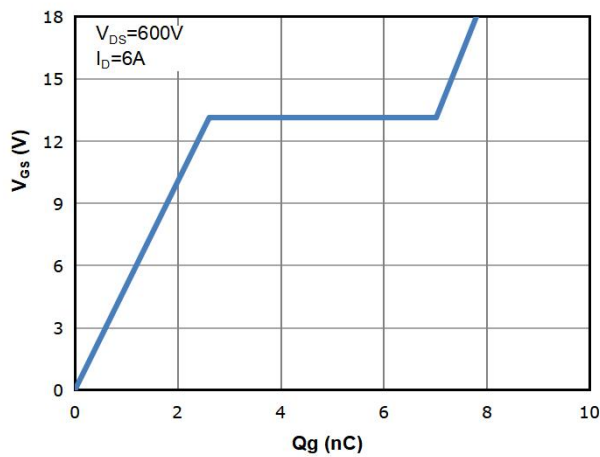


Fig 10: Body-diode Forward Characteristics

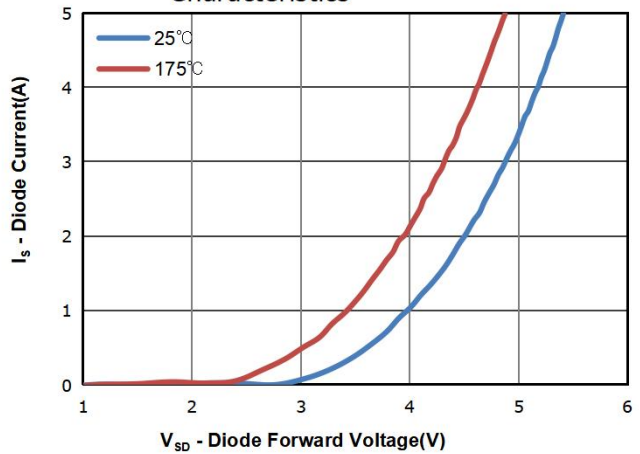


Fig 11: Power Dissipation

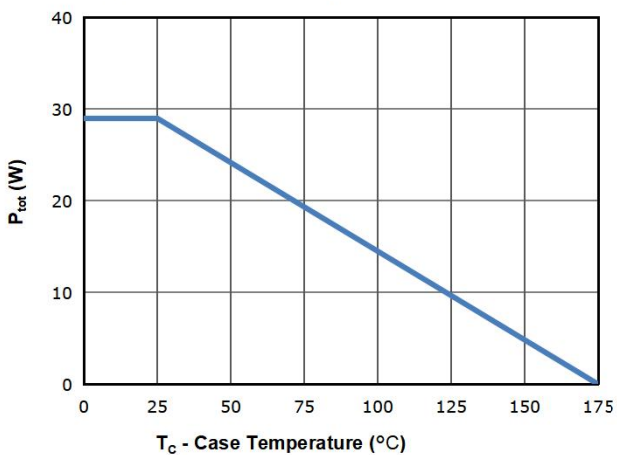


Fig 12: Drain Current Derating

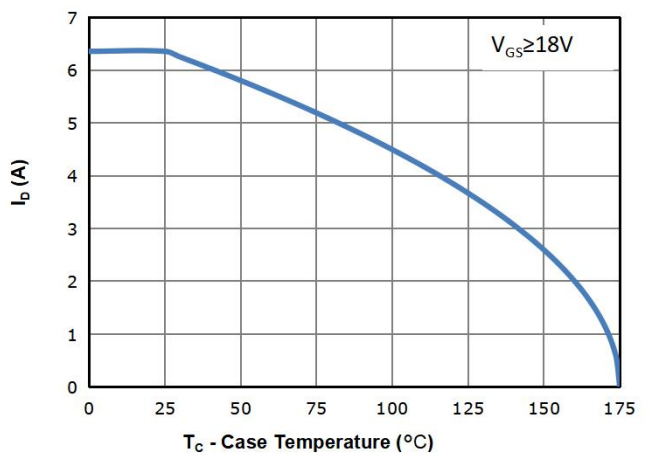




Fig 13: Safe Operating Area

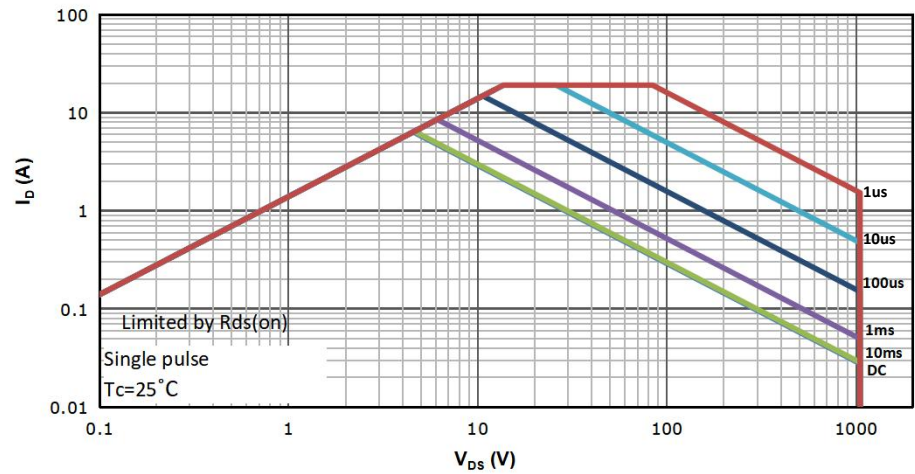
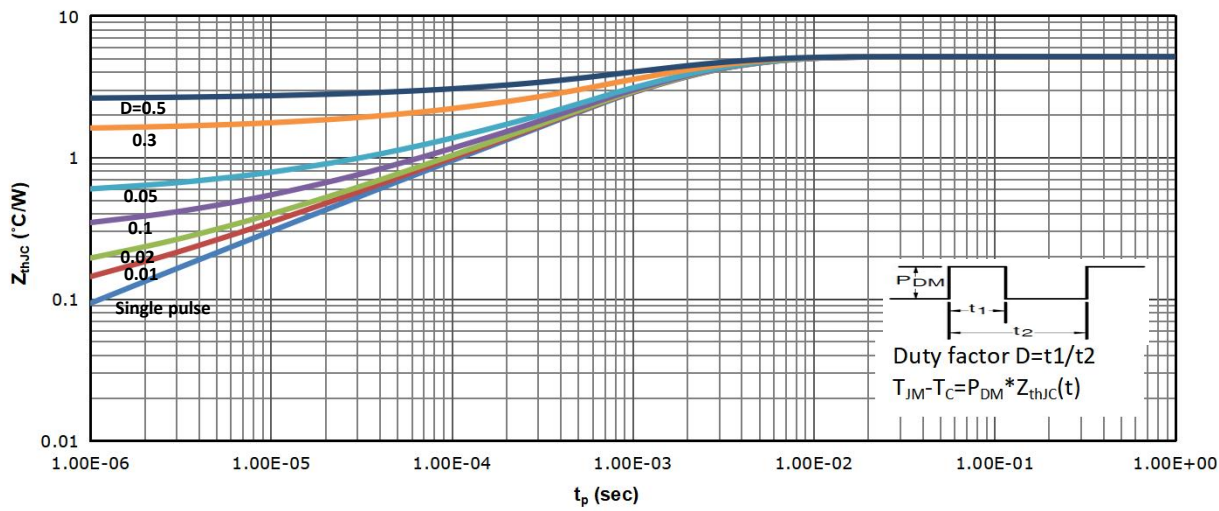
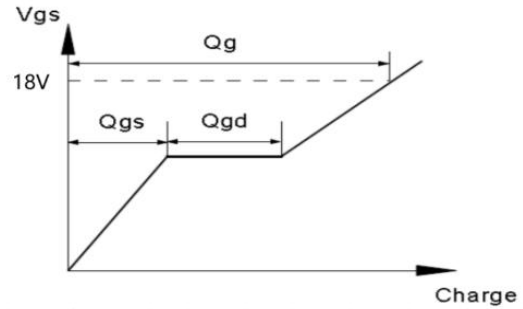
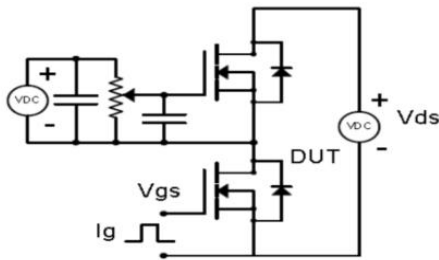


Fig 14: Max. Transient Thermal Impedance

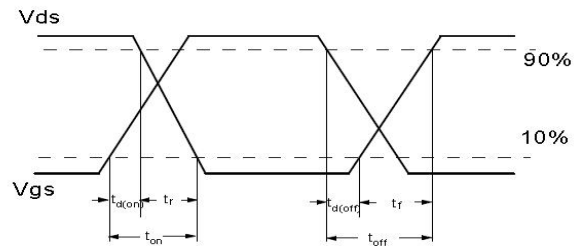
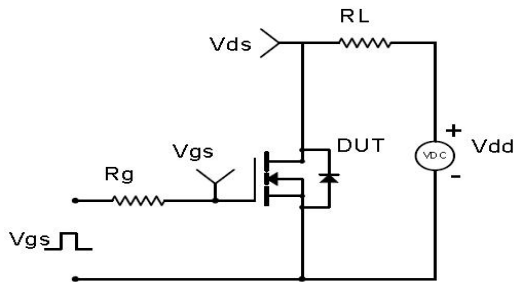


Test Circuit & Waveform

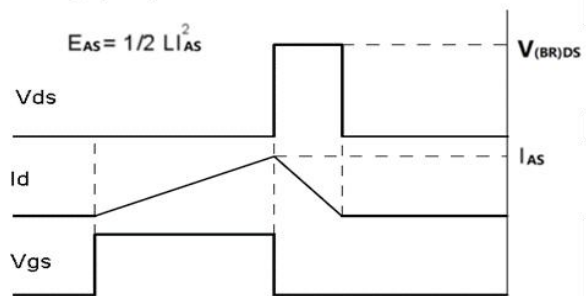
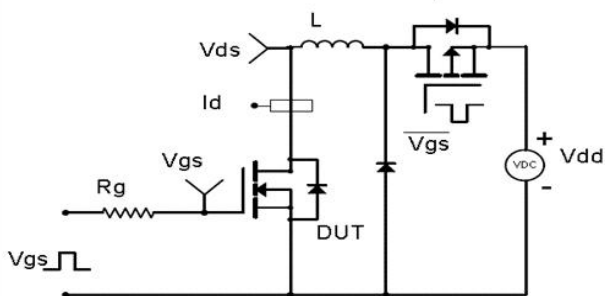
Gate Charge Test Circuit & Waveform



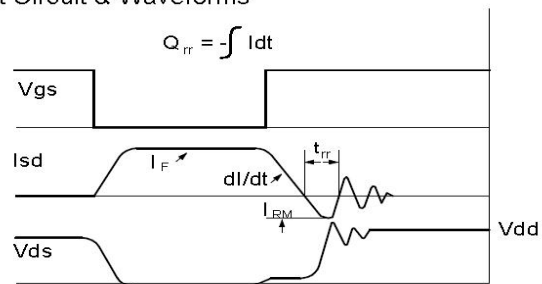
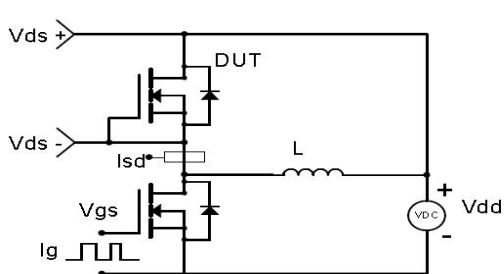
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



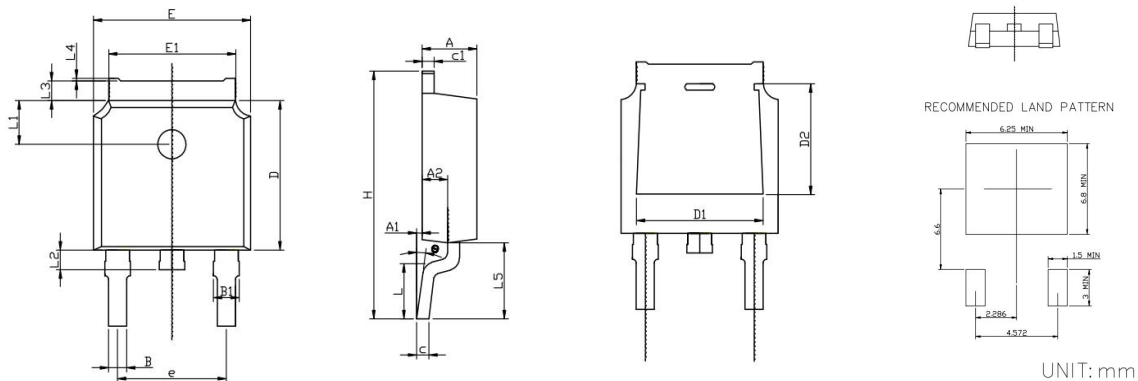
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Package Outline: TO-252-2L



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

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