STP413D

P Channel Enhancement Mode MOSFET

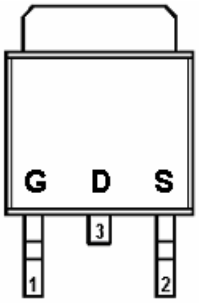
-12.0A

DESCRIPTION

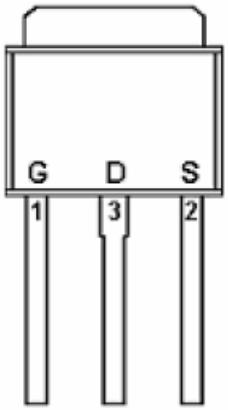
STP413D is the P-Channel logic enhancement mode power field effect transistor which is produced using high cell density, DMOS trench technology. The STP413D has been designed specially to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

PIN CONFIGURATION (D-PAK)

TO-252



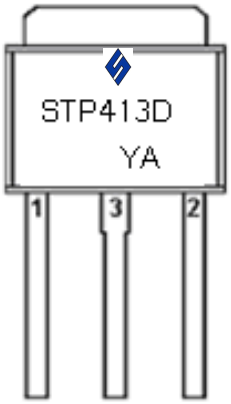
TO-251

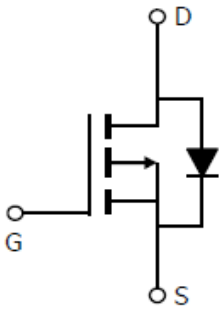


FEATURE

- -40V/-12.0A, $R_{DS(ON)}$ = 36mΩ (Typ.) @V_{GS} = -10V
- -40V/-8.0A, $R_{DS(ON)}$ = 52mΩ @V_{GS} =-4.5V
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability
- TO-252,TO-251 package design

PART MARKING





Y: Year Code A: Process Code

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ABSOULTE MAXIMUM RATINGS (Ta = 25℃ Unless otherwise noted)

Parameter		Symbol	Typical	Unit
Drain-Source Voltage		VDSS	-40	V
Gate-Source Voltage		VGSS	±20	V
Continuous Drain Current (TJ=150℃)	TA=25℃ TA=70℃	ID	-12.0 -10.0	A
Pulsed Drain Current		IDM	-30	A
Continuous Source Current (Diode Conduction)		IS	-12	A
Power Dissipation	TA=25℃ TA=70℃	PD	50 25	W
Operation Junction Temperature		TJ	150	℃
Storgae Temperature Range		TSTG	-55/150	℃
Thermal Resistance-Junction to Ambient		RθJA	60	℃/W

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STANSON

STP413D

P Channel Enhancement Mode MOSFET

-12.0A

ELECTRICAL CHARACTERISTICS (Ta = 25℃ Unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,ID=-250uA	-40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},ID=-250uA	-0.8		-2.5	V
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-40V,V_{GS}=0V			-1	uA
		V_{DS}=-40V,V_{GS}=0V T_J=55℃			-5	
On-State Drain Current	$I_{D(on)}$	V_{DS}≧-10V,V_{DS}=-5V	-30			A
Drain-source On-Resistance	$R_{DS(on)}$	V_{GS}=-10V,I_D=-12A V_{GS}=-4.5V,I_D=-8A		36 52	41 57	mΩ
Forward Transconductance	gfs	V_{DS}=-5V,I_D=-12A		23		S
Diode Forward Voltage	V_{SD}	I_S=-1.0A,V_{GS}=0V			-1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=-10V,V_{DS}=-20V I_D=-12A		16.5		nC
Gate-Source Charge	Q_{gs}			3.8		
Gate-Drain Charge	Q_{gd}			3.5		
Input Capacitance	C_{iss}	V_{DS} =-20V,VGS=0V F=1MHz		900		pF
Output Capacitance	C_{oss}			69		
Reverse TransferCapacitance	C_{rss}			115		
Turn-On Time	$t_{d(on)}$	V_{GS}=-10V,V_{DS}=-20V R_L=1.6Ω,R_{GEN}=3Ω		6.9		nS
	tr			9		
Turn-Off Time	$t_{d(off)}$			44.8		
	tf			41.2		

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TYPICAL CHARACTERICTICS

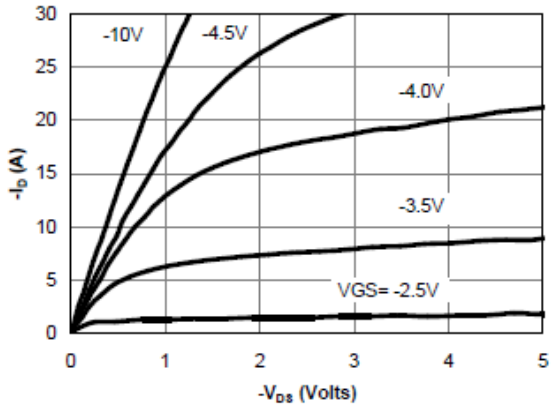

Figure 1: On-Region Characteristics

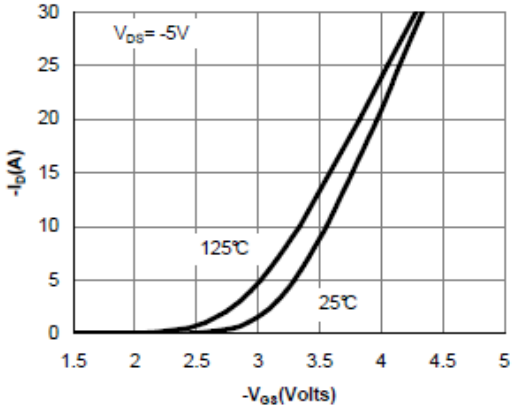

Figure 2: Transfer Characteristics

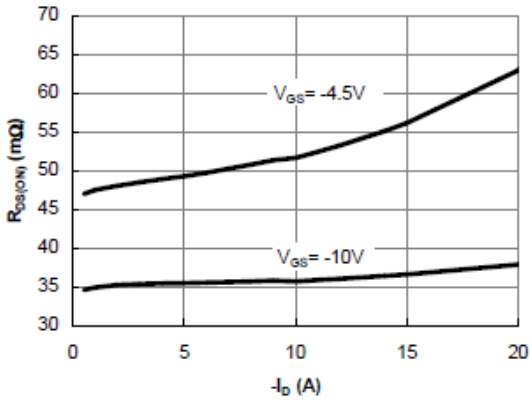

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

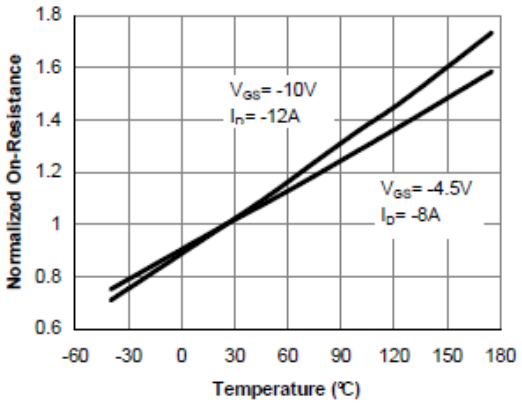

Figure 4: On-Resistance vs. Junction Temperature

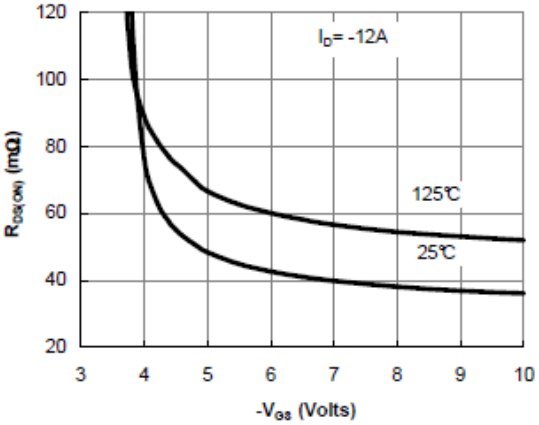

Figure 5: On-Resistance vs. Gate-Source Voltage

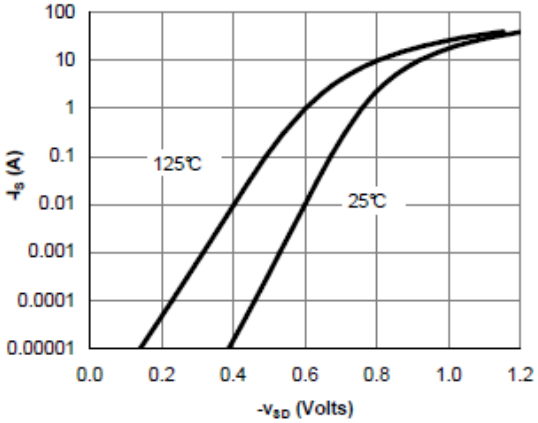

Figure 6: Body-Diode Characteristics

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TYPICAL CHARACTERICTICS

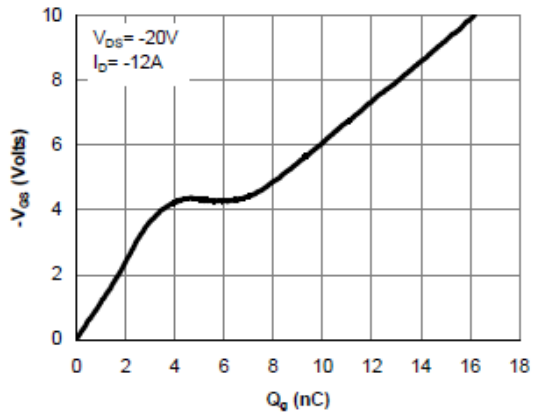

Figure 7: Gate-Charge Characteristics

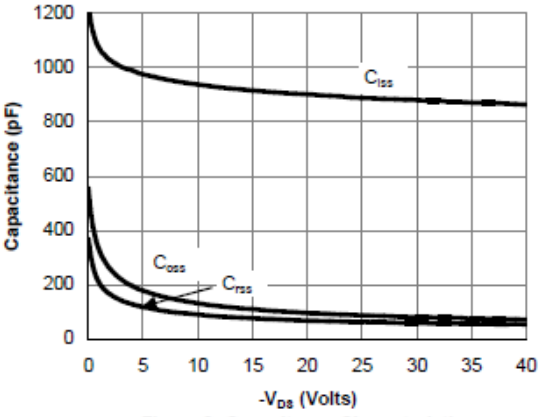

Figure 8: Capacitance Characteristics

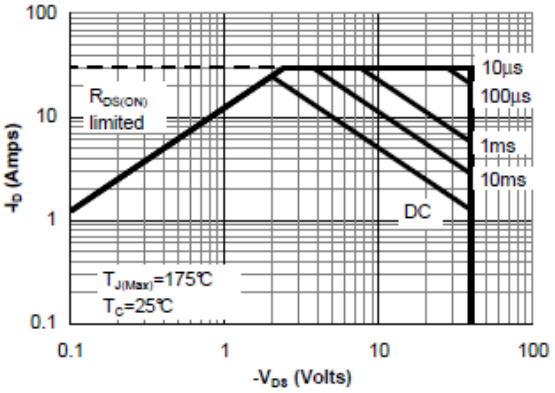

Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

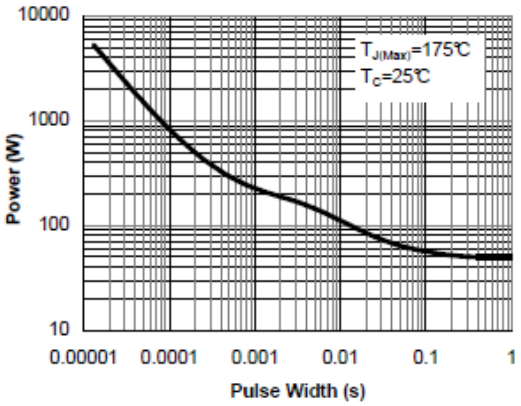

Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

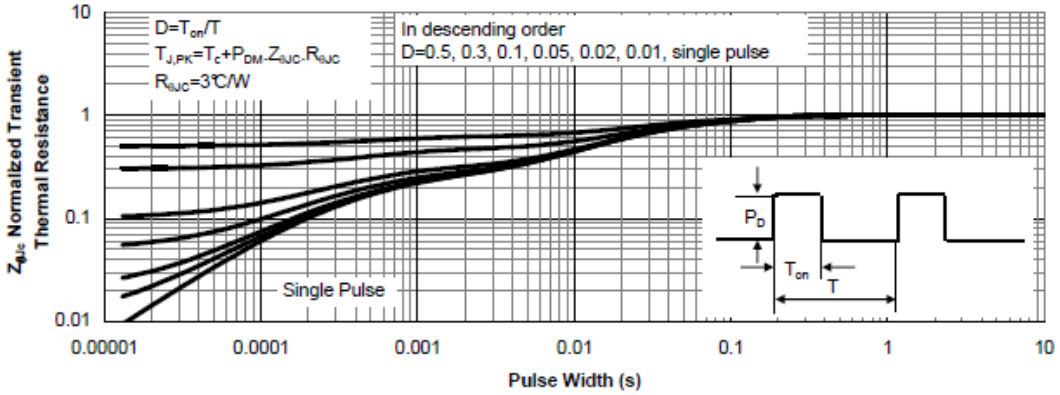

Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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TYPICAL CHARACTERICTICS

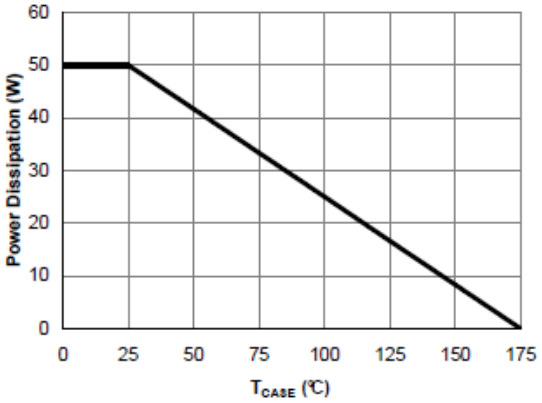

Figure 12: Power De-rating (Note B)

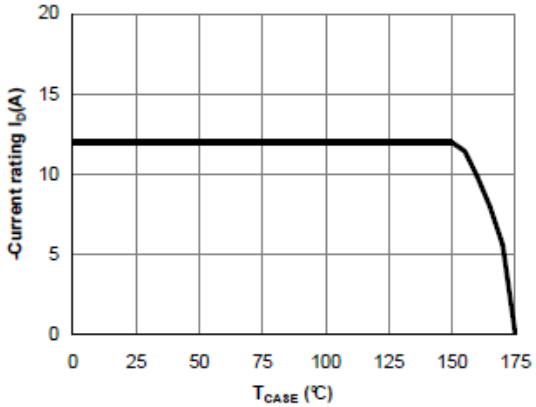

Figure 13: Current De-rating (Note B)

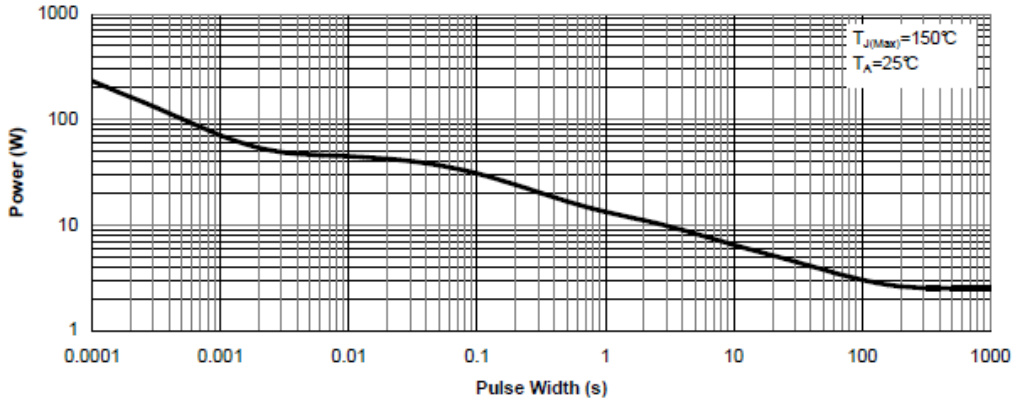

Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

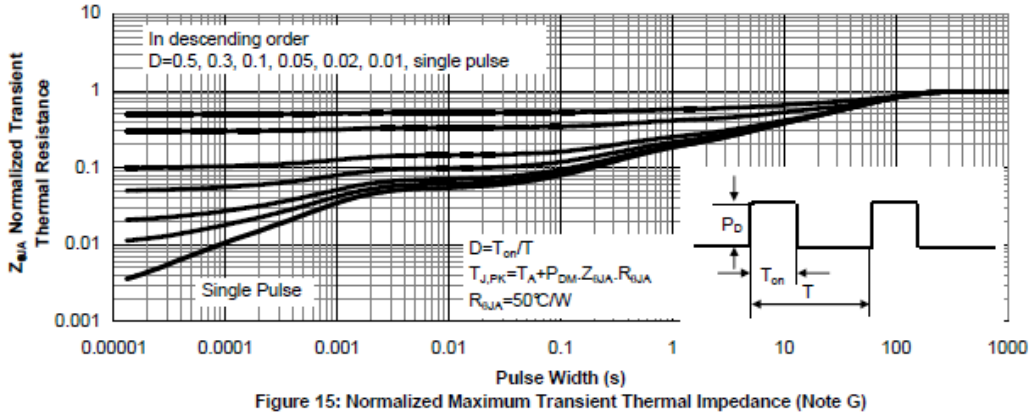

Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

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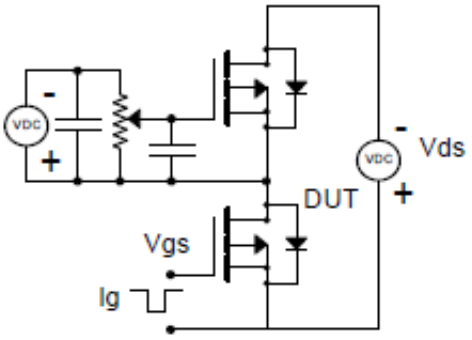
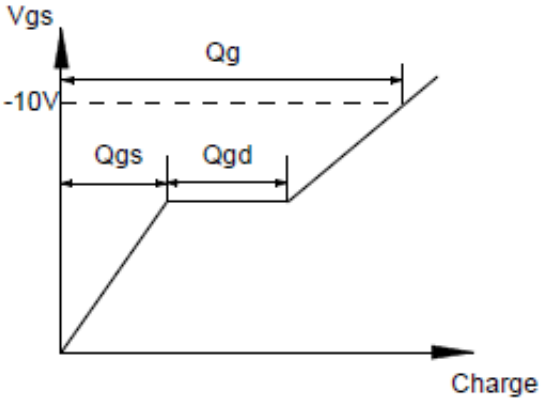
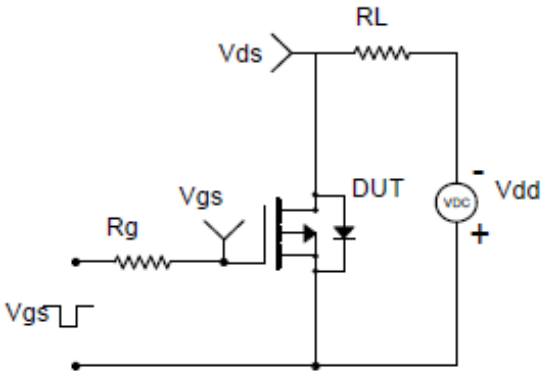
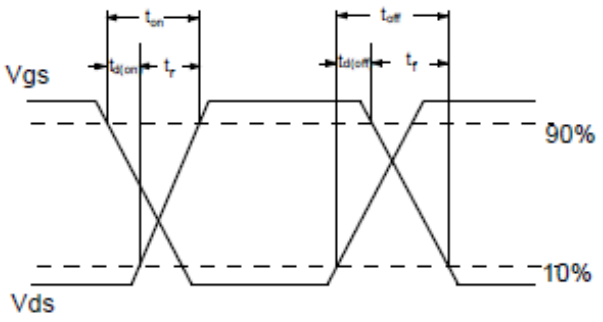
GATE CHARGE TEST CIRCUIT & WAVEFORM





TESISTIVE SWITCHING TEST CIRCUIT & WAVEFORMS





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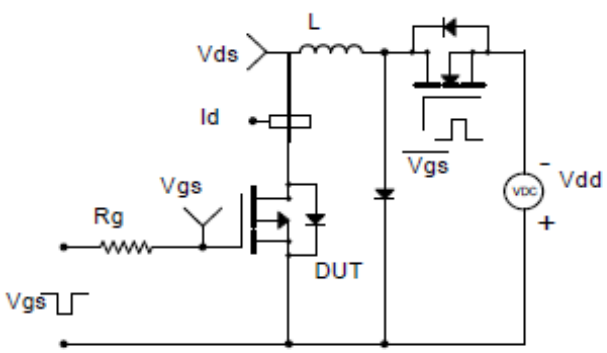
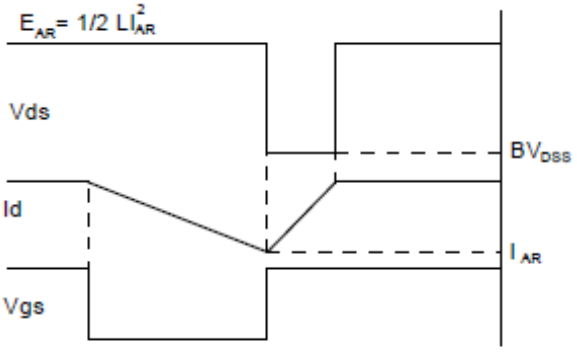
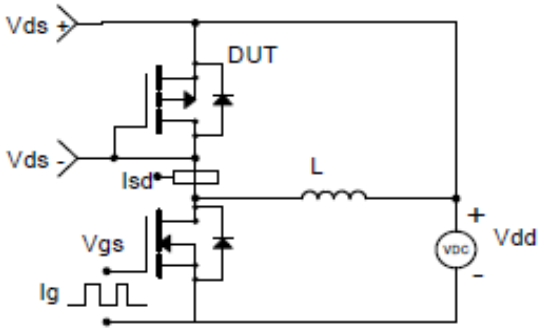
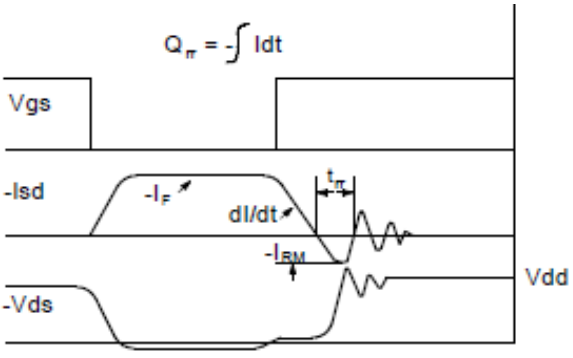
UNCLAMPED INDUCTIVE SWITCHING (UIS) TEST CIRCUIT & WAVEFORMS





DIODE TEC0VERY TEST CIRCUIT & WAVEFORMS





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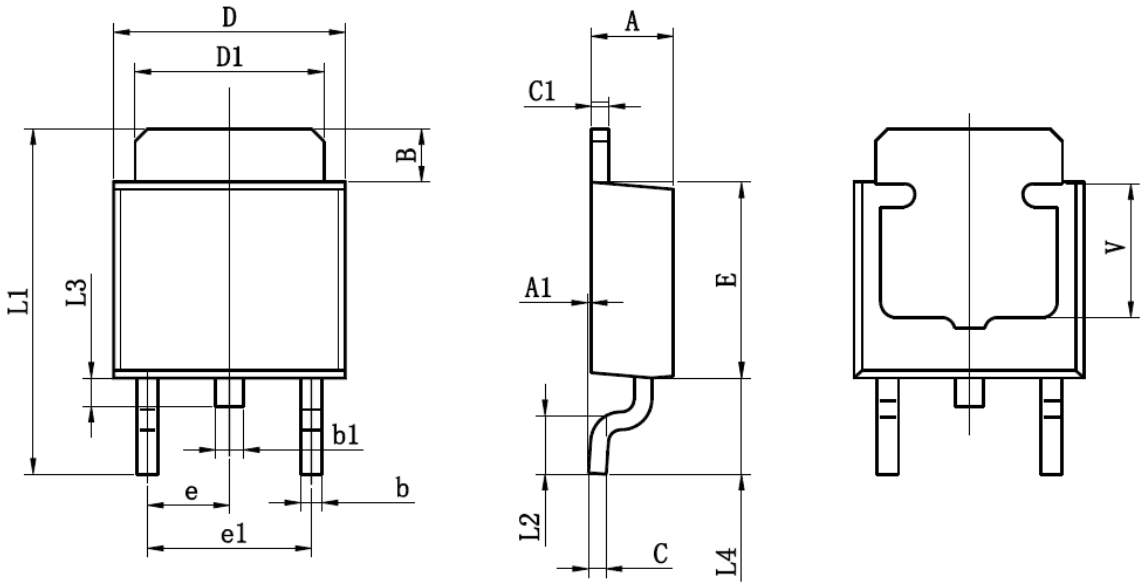
TO-252-2L PACKAGE OUTLINE SOP-8P



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300TYP		0.091TYP	
e1	4.500	4.700	0.177	0.185
L1	9.500	9.900	0.374	0.390
L2	1.400	1.780	0.055	0.070
L3	0.650	0.950	0.026	0.037
L4	2.550	2.900	0.100	0.114
V	3.80REF		0.150REF	

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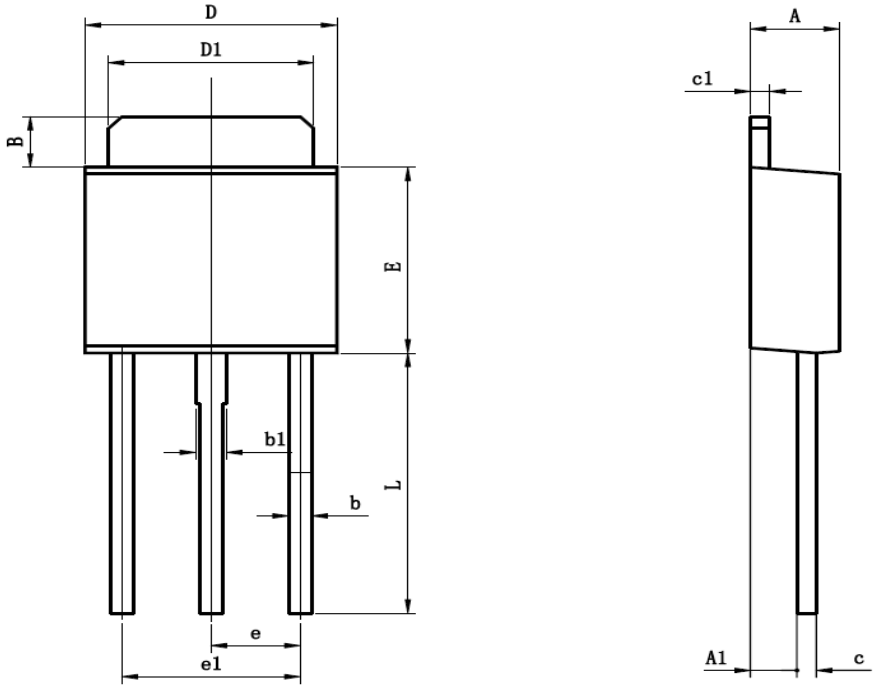

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	1.020	1.270	0.040	0.050
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300TYP		0.091TYP	
e1	4.500	4.700	0.177	0.185
L	7.500	7.900	0.295	0.311

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