SPN9977
N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN9977 is the N-Channel logic enhancement mode power field effect transistors are produced using super high cell density , DMOS trench technology. The SPN9977 has been designed specifically 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.

APPLICATIONS

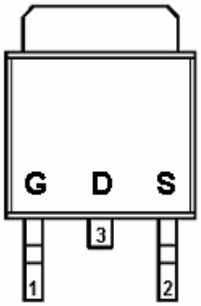
- Power Management in Note book
- Powered System
- DC/DC Converter
- Load Switch

FEATURES

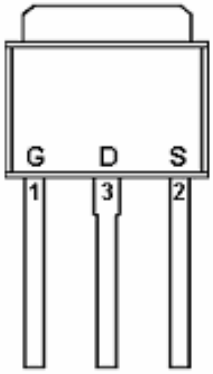
- 60V/8A,$R_{DS(ON)}$= 115mΩ@V_{GS}= 10V
- 60V/6A,$R_{DS(ON)}$= 110mΩ@V_{GS}= 4.5V
- High density cell design for extremely low RDS (ON)
- Exceptional on-resistance and maximum DC current capability
- TO-252,TO-251 package design

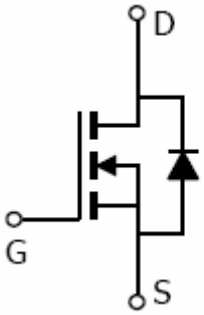
PIN CONFIGURATION

TO-252

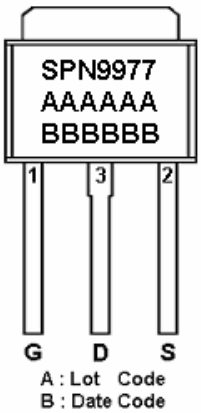


TO-251





PART MARKING



SPN9977
N-Channel Enhancement Mode MOSFET

PIN DESCRIPTION

Pin	Symbol	Description
1	G	Gate
2	S	Source
3	D	Drain

ORDERING INFORMATION

Part Number	Package	Part Marking
SPN9977T252RGB	TO-252	SPN9977
SPN9977T251TGB	TO-251	SPN9977

※ SPN9977T252RGB : Tape Reel ; Pb – Free ; Halogen - Free
※ SPN9977T251RGB : Tube ; Pb – Free ; Halogen - Free

ABSOULTE MAXIMUM RATINGS

(T_A=25℃ Unless otherwise noted)

Parameter			Symbol	Typical	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate –Source Voltage			V_{GSS}	±20	V
Continuous Drain Current(T_J=150℃)		T_A=25℃	I_D	14	A
		T_A=70℃		9.0	
Pulsed Drain Current			I_{DM}	45	A
Avalanche Current			I_{AS}	14	A
Power Dissipation	T_A=25℃	TO-252-2L	P_D	40	W
		TO-251		55	
Operating Junction Temperature			T_J	150	℃
Storage Temperature Range			T_{STG}	-55/150	℃
Thermal Resistance-Junction to Ambient			$R_{\theta JA}$	100	℃/W

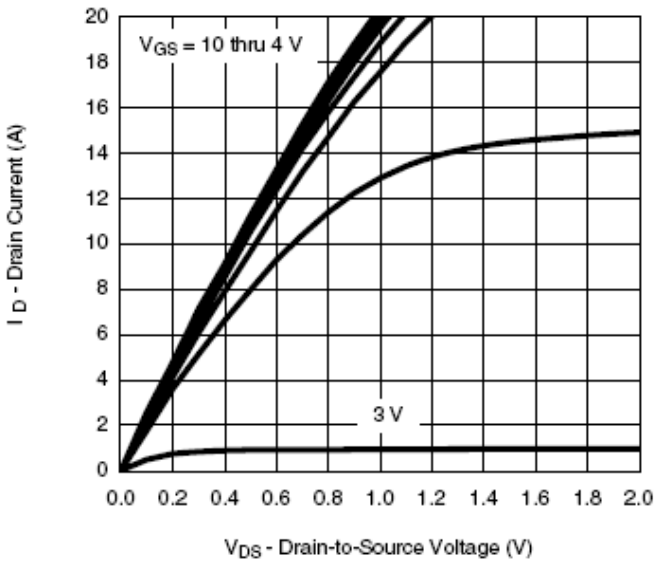
SPN9977
N-Channel Enhancement Mode MOSFET

ELECTRICAL CHARACTERISTICS

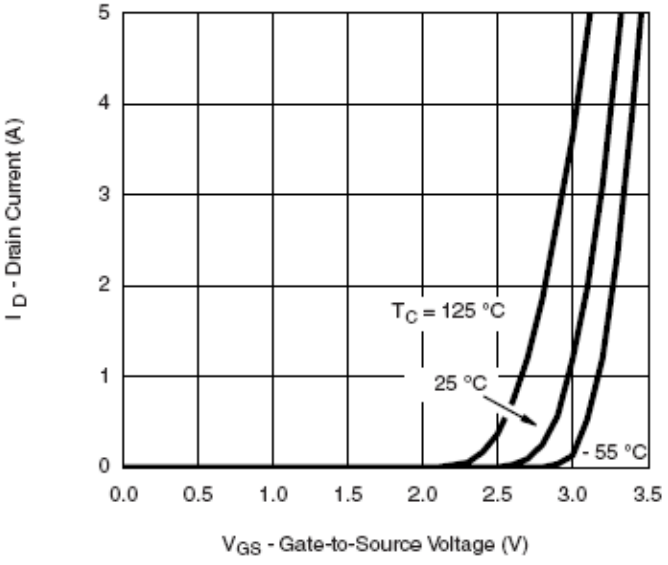
(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	60			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	0.5		1.5	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V			1	uA
		V_{DS}=60V,V_{GS}=0V T_J=85℃			5	
On-State Drain Current	$I_{D(on)}$	V_{DS}≥5V,V_{GS} =10V	14			A
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}= 10V,I_D=8A		0.110	0.115	Ω
		V_{GS}=4.5V,I_D=6A		0.105	0.110	
Forward Transconductance	gfs	V_{DS}=15V,I_D=4.3A		15		S
Diode Forward Voltage	V_{SD}	I_S=1.7A,V_{GS} =0V		0.8	1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=30V,V_{GS}=10V I_D= 4.3A		15	20	nC
Gate-Source Charge	Q_{gs}			2.5		
Gate-Drain Charge	Q_{gd}			2.6		
Input Capacitance	C_{iss}	V_{DS}=15,V_{GS}=0V f=1MHz		675		pF
Output Capacitance	C_{oss}			80		
Reverse Transfer Capacitance	C_{rss}			40		
Turn-On Time	$t_{d(on)}$	V_{DD}=30V,R_L=8.8Ω I_D≡3.4A,V_{GEN}=10V R_G=1Ω		10	20	nS
	t_r			15	25	
Turn-Off Time	$t_{d(off)}$			25	35	
	t_f			12	20	

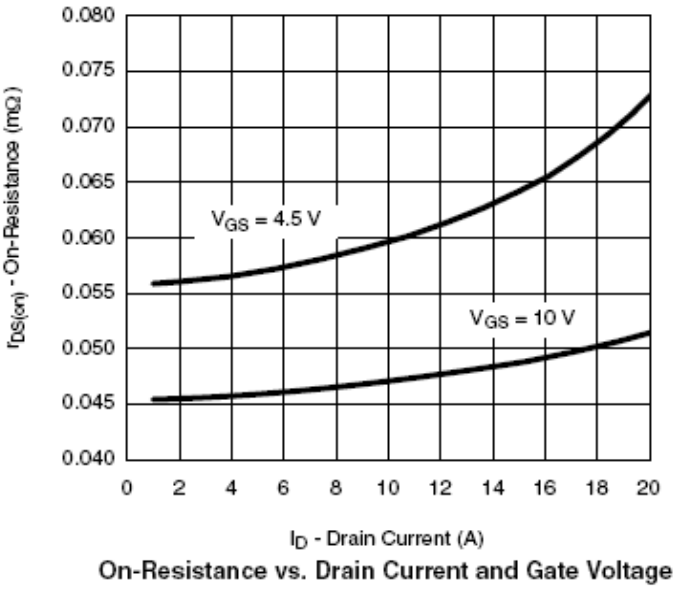
TYPICAL CHARACTERISTICS



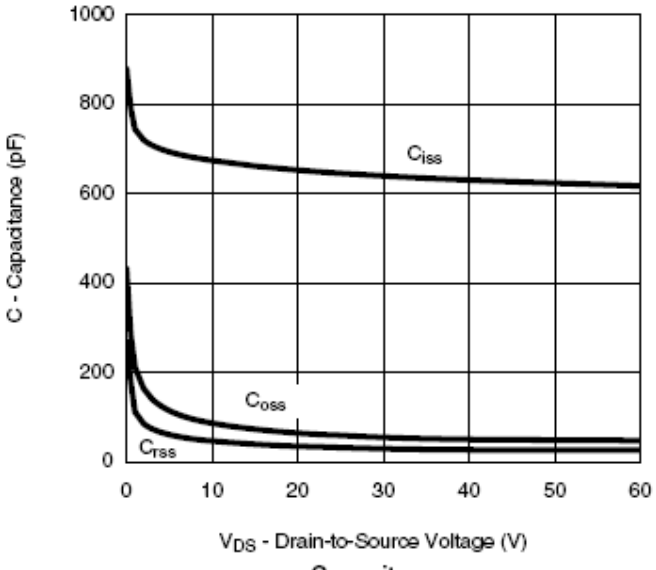
Output Characteristics



Transfer Characteristics

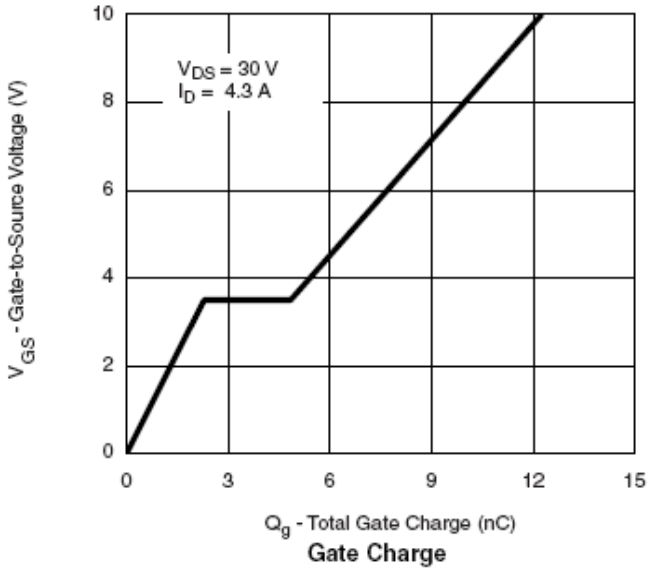


On-Resistance vs. Drain Current and Gate Voltage

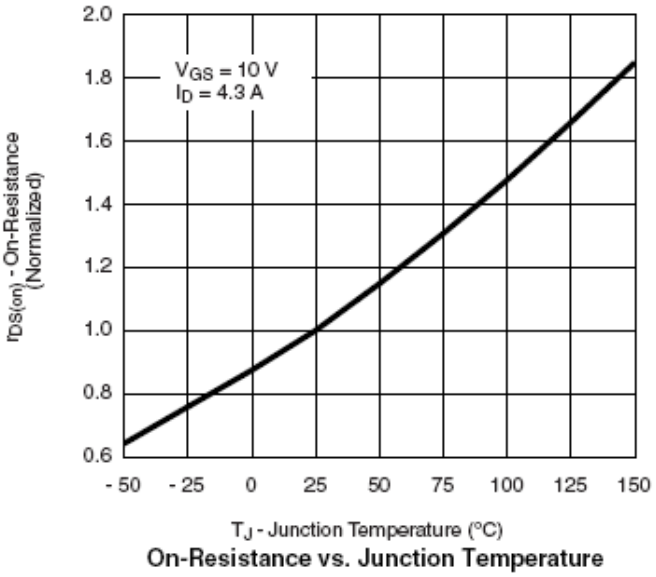


Capacitance

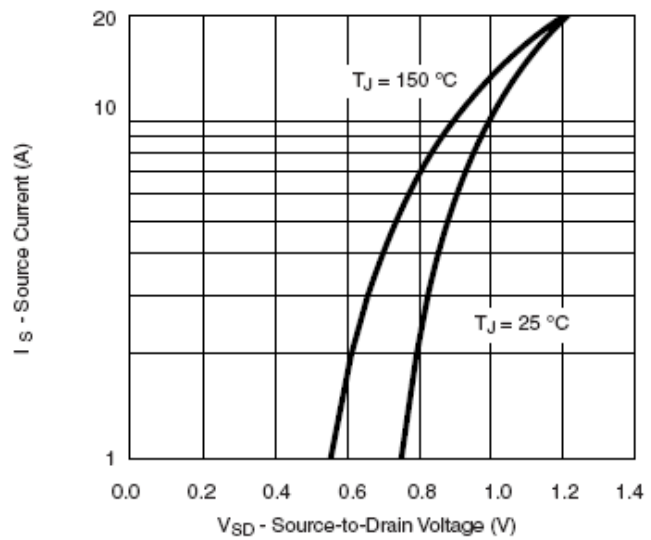
TYPICAL CHARACTERISTICS



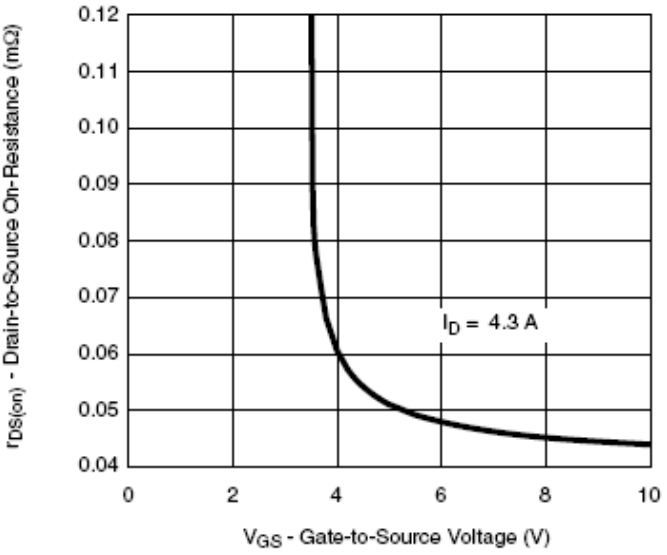
Gate Charge



On-Resistance vs. Junction Temperature

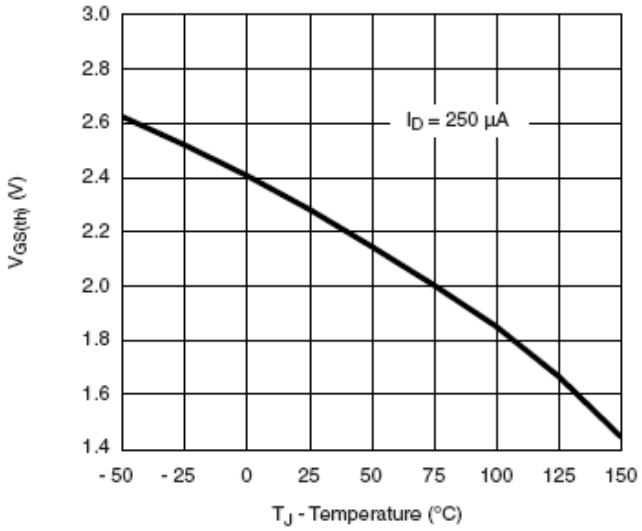


Source-Drain Diode Forward Voltage

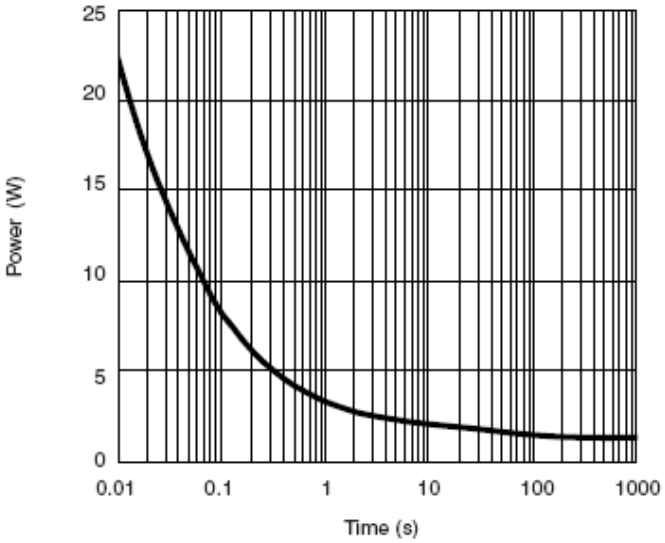


On-Resistance vs. Gate-to-Source Voltage

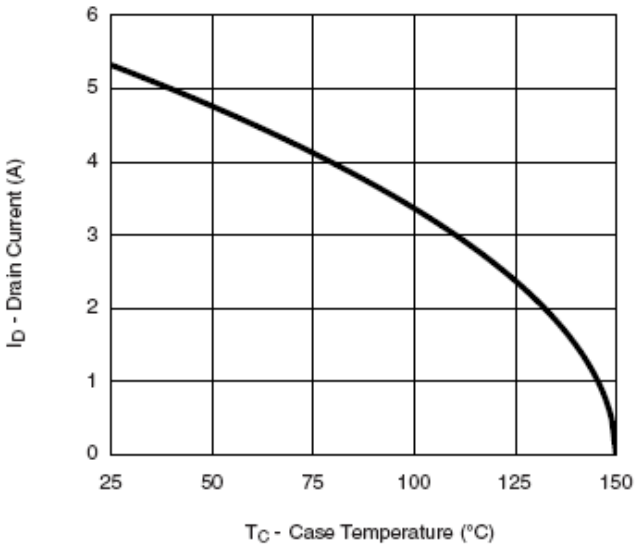
TYPICAL CHARACTERISTICS



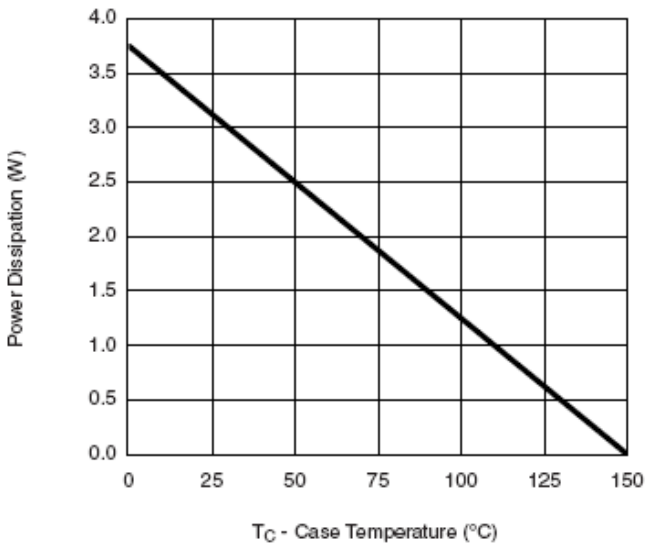
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

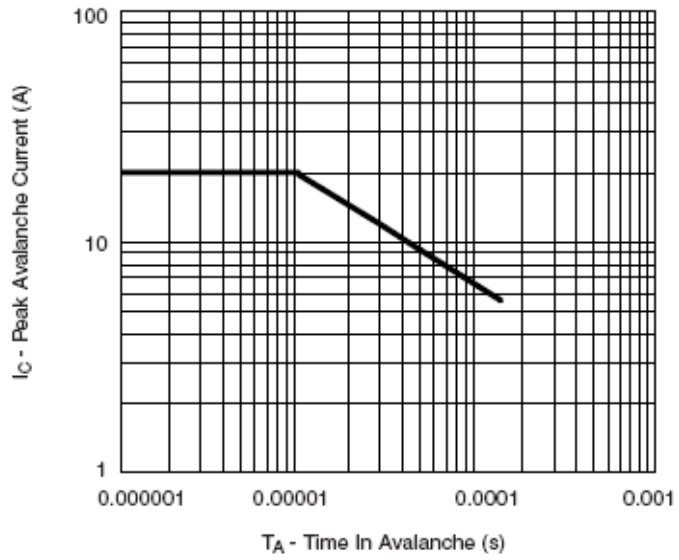


Current Derating*

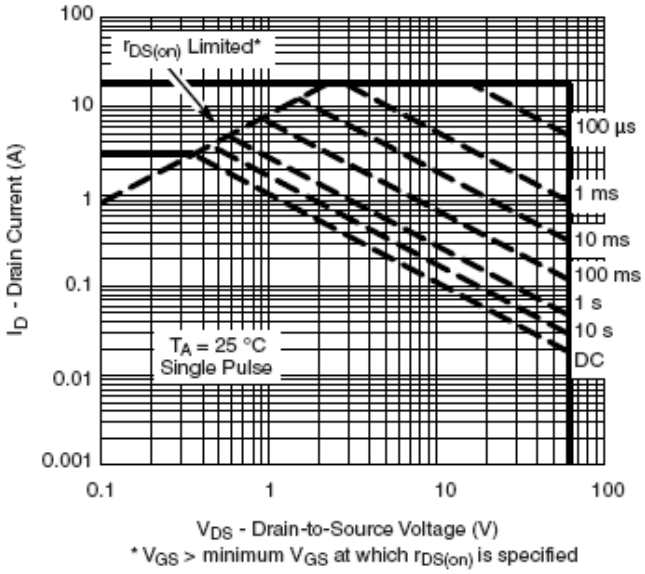


Power Derating

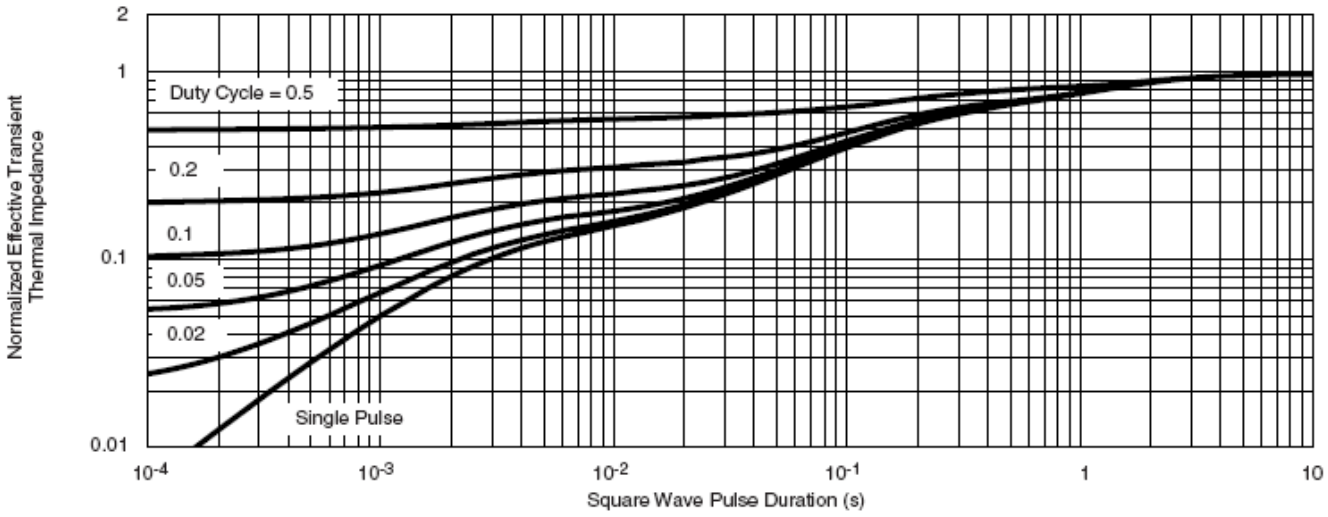
TYPICAL CHARACTERISTICS



Single Pulse Avalanche Capability

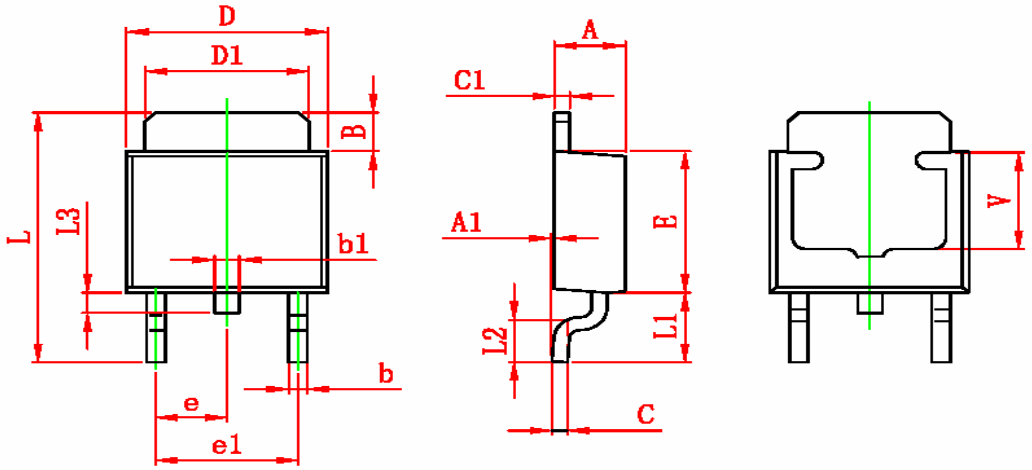


Safe Operating Area



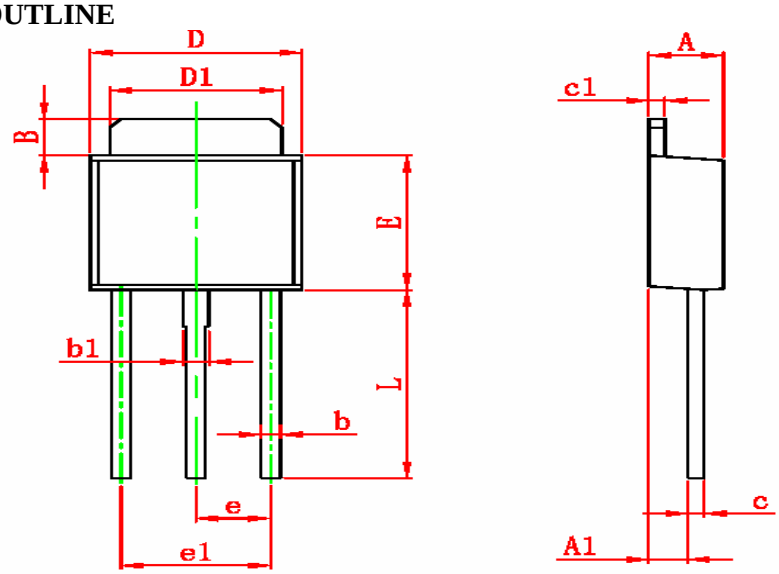
Normalized Thermal Transient Impedance, Junction-to-Case

TO-252 PACKAGE OUTLINE



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	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.350	0.650	0.014	0.026
V	3.80 REF		0.150 REF	

TO-251 PACKAGE OUTLINE



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	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	7.500	7.900	0.295	0.311

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