

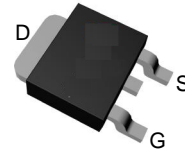
Features

- 20V/50A,
 $R_{DS(ON)}=7m\Omega$ (Typ.) @ $V_{GS}=4.5V$
 $R_{DS(ON)}=10m\Omega$ (Typ.) @ $V_{GS}=2.5V$
- Reliable and Rugged
- Avalanche Rated
- Lead Free and Green Devices Available
(RoHS Compliant)
- 100% UIS + R_g Tested

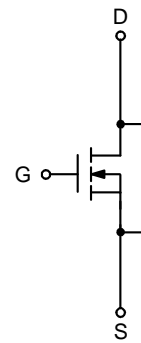
Applications

- Power Management in Desktop Computer or DC/DC Converters.

Pin Description



Top View of TO-252



N-Channel MOSFET

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_A=25^\circ\text{C}$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	20	V	
V_{GSS}	Gate-Source Voltage	± 12		
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
I_S	Diode Continuous Forward Current	50	A	
I_{DP}	300 μs Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	160	A
		$T_C=100^\circ\text{C}$	90	
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	50	A
		$T_C=100^\circ\text{C}$	20	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	50	W
		$T_C=100^\circ\text{C}$	20	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.5	$^\circ\text{C}/\text{W}$	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	50	$^\circ\text{C}/\text{W}$	
E_{AS}	Drain-Source Avalanche Energy, $L=0.5\text{mH}$	225	mJ	

Note : * Current limited by bond wire.

Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_{DS}=250\mu\text{A}$	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=16\text{V}, V_{GS}=0\text{V}$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu\text{A}$	0.5	0.8	1.0	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 12\text{V}, V_{DS}=0\text{V}$	-	-	± 100	nA
$R_{DS(ON)}^a$	Drain-Source On-state Resistance	$V_{GS}=4.5\text{V}, I_{DS}=40\text{A}$	-	7	12	m Ω
		$V_{GS}=2.5\text{V}, I_{DS}=20\text{A}$	-	10	14.5	
Diode Characteristics						
V_{SD}^a	Diode Forward Voltage	$I_{SD}=40\text{A}, V_{GS}=0\text{V}$	-	0.85	1.1	V
t_{rr}	Reverse Recovery Time	$I_{DS}=40\text{A}, dI_{SD}/dt=100\text{A}/\mu\text{s}$	-	25	-	ns
Q_{rr}	Reverse Recovery Charge		-	10	-	nC

Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

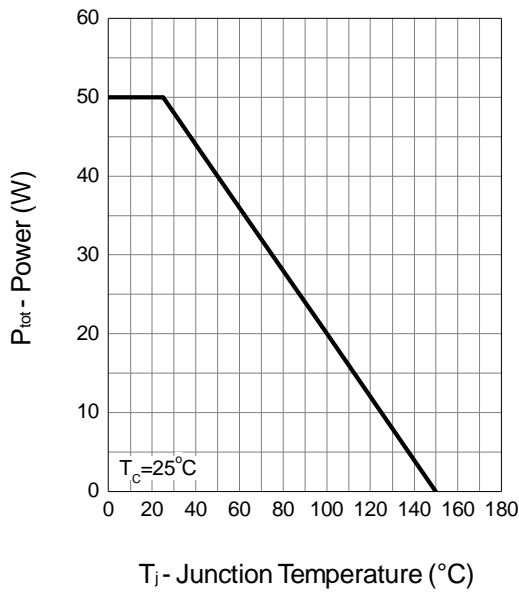
Symbol	Parameter	Test Conditions	SM2558NUB			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics ^b						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.6	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=15V,$ Frequency=1.0MHz	-	2000	2800	pF
C_{oss}	Output Capacitance		-	400	-	
C_{rss}	Reverse Transfer Capacitance		-	320	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=15V, R_L=15\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$	-	14	26	ns
t_r	Turn-on Rise Time		-	12	23	
$t_{d(OFF)}$	Turn-off Delay Time		-	49	89	
t_f	Turn-off Fall Time		-	21	39	
Gate Charge Characteristics ^b						
Q_g	Total Gate Charge	$V_{DS}=15V, V_{GS}=4.5V,$ $I_{DS}=40A$	-	22.5	32	nC
Q_{gs}	Gate-Source Charge		-	5.6	-	
Q_{gd}	Gate-Drain Charge		-	13	-	

Note a : Pulse test ; pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

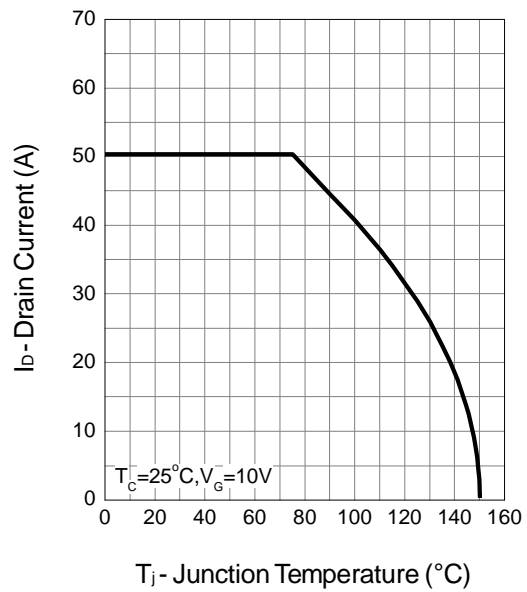
Note b : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

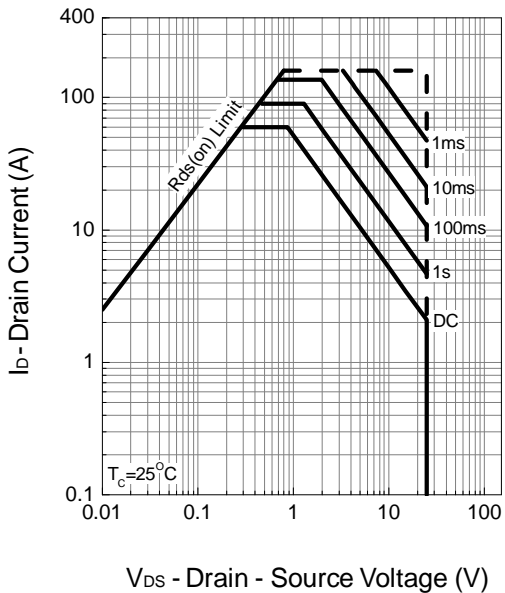
Power Dissipation



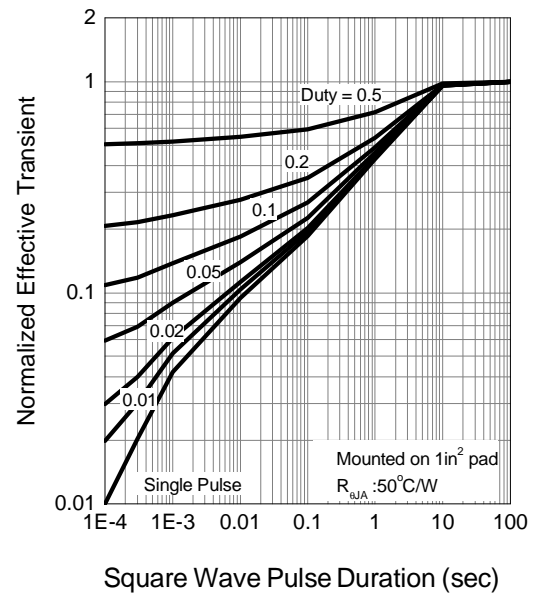
Drain Current



Safe Operation Area

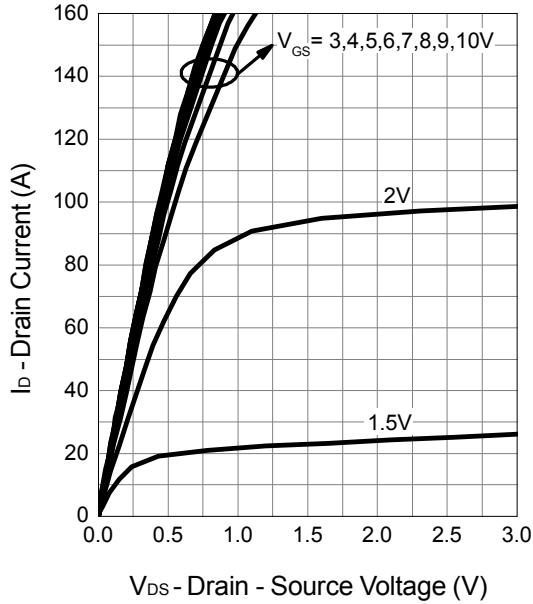


Thermal Transient Impedance

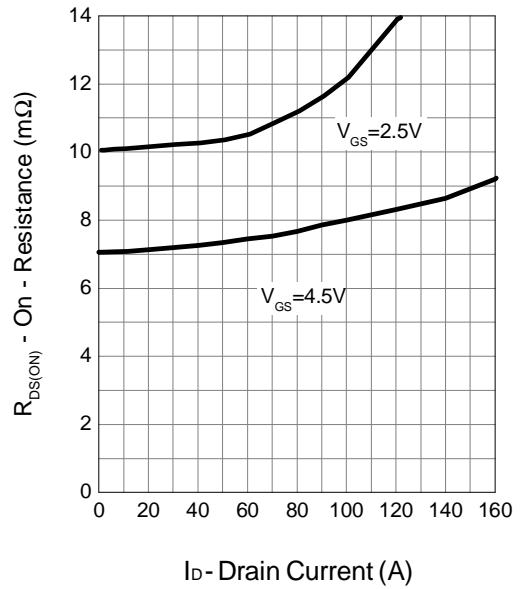


Typical Operating Characteristics (Cont.)

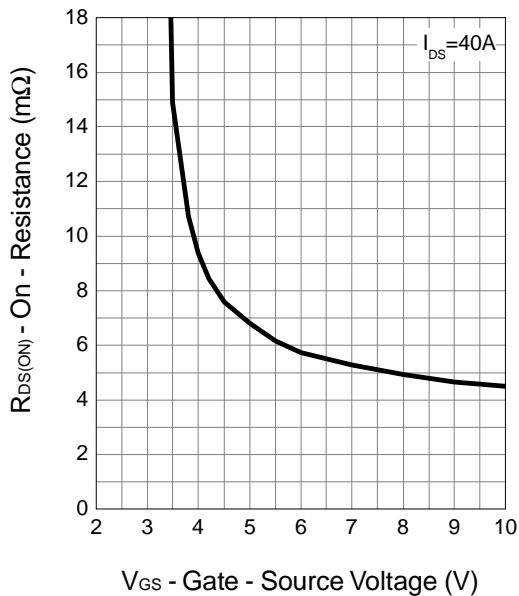
Output Characteristics



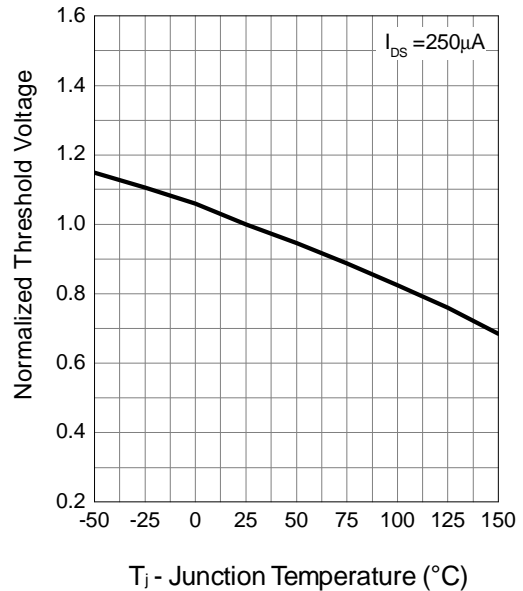
Drain-Source On Resistance



Gate-Source On Resistance

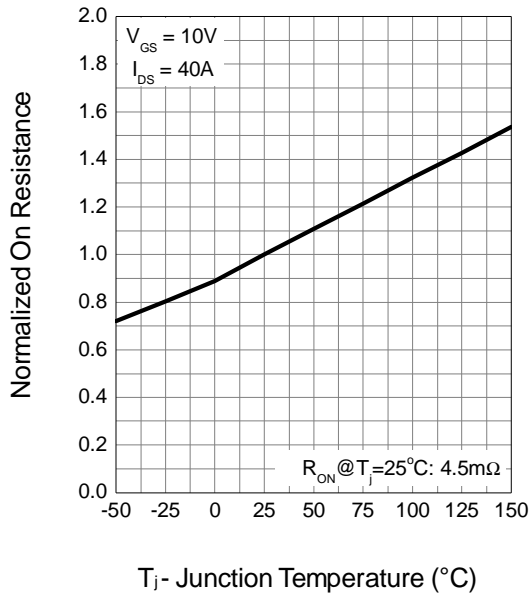


Gate Threshold Voltage

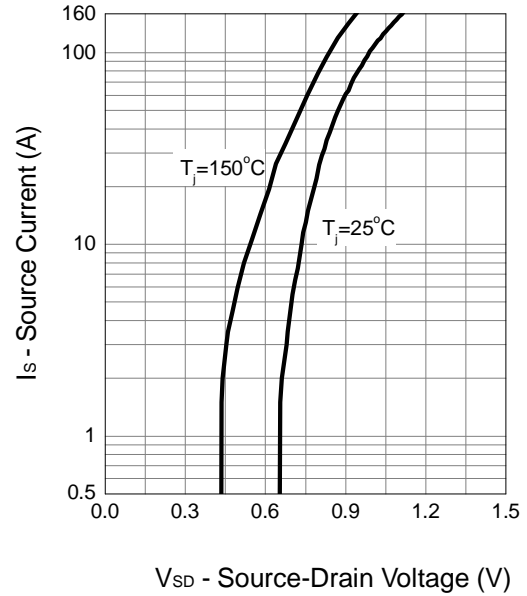


Typical Operating Characteristics (Cont.)

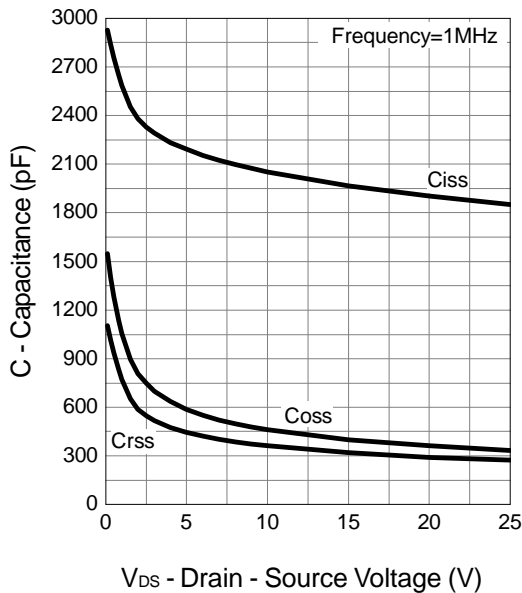
Drain-Source On Resistance



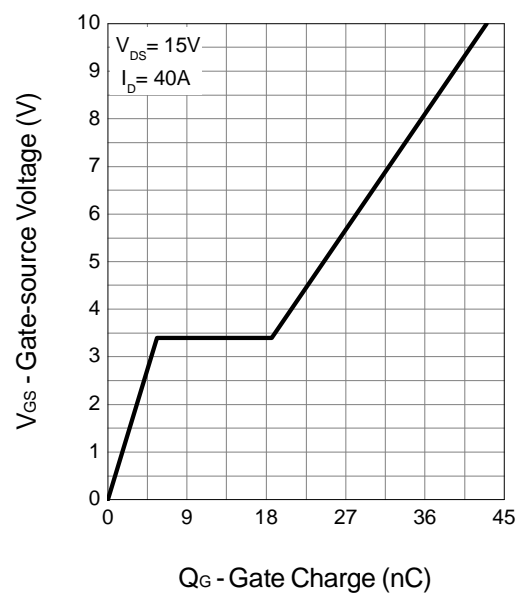
Source-Drain Diode Forward



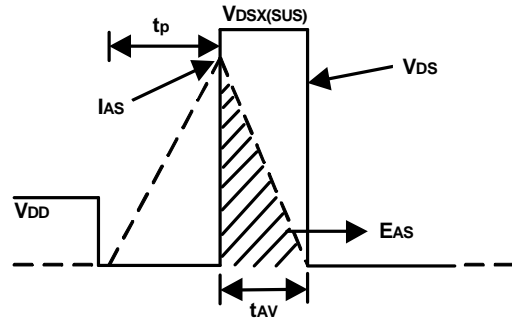
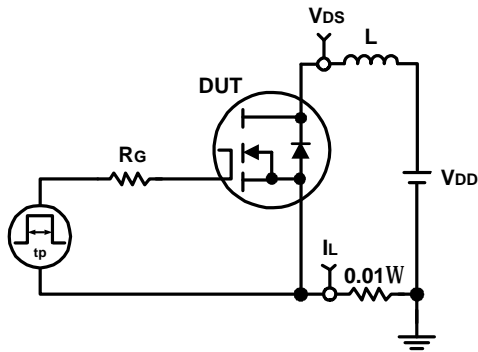
Capacitance



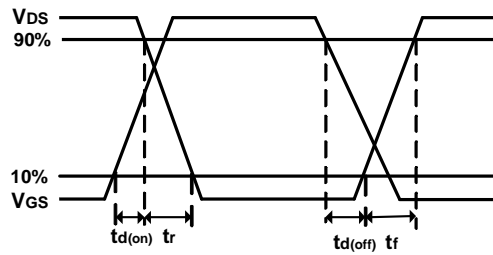
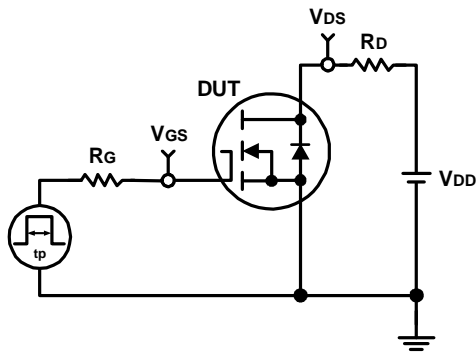
Gate Charge



Avalanche Test Circuit and Waveforms

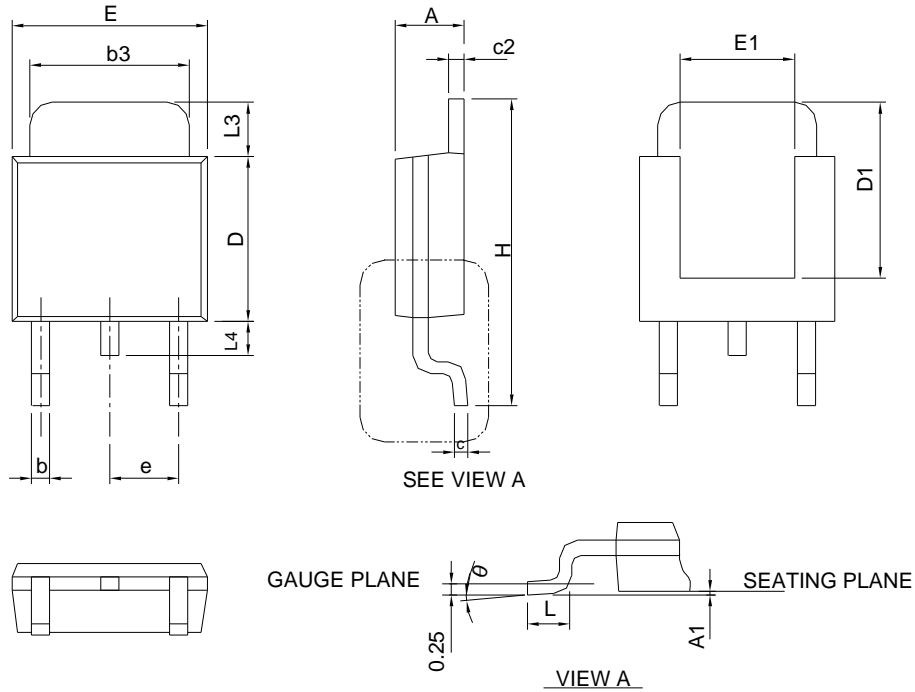


Switching Time Test Circuit and Waveforms



Package Information

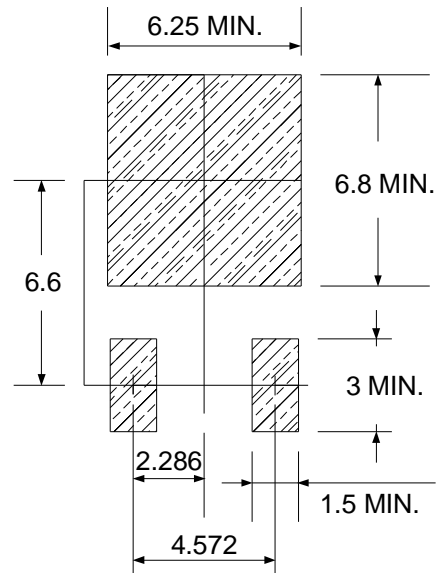
TO-252



DIMENSIONS	TO-252			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.13	-	0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	0.90	1.78	0.035	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
θ	0°	8°	0°	8°

Note : Follow JEDEC TO-252 .

RECOMMENDED LAND PATTERN



UNIT: mm