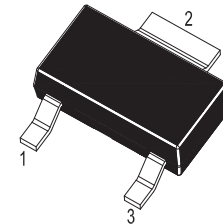
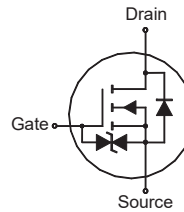


N-Channel Enhancement Mode MOSFET

Features

- AEC-Q101 Qualified
- Built-in G-S Protection Diode
- Halogen and Antimony Free(HAF), RoHS compliant
- ESD Protected
- Typical ESD Protection HBM Class 1C



1.Gate 2.Drain 3.Source
SOT-223-2 Plastic Package

Classification	Voltage Range(V)
0A	< 125
0B	125 to < 250
1A	250 to < 500
1B	500 to < 1000
1C	1000 to < 2000
2	2000 to < 4000
3A	4000 to < 8000
3B	≥ 8000

Key Parameters

Parameter	Value	Unit
BV_{DSS}	900	V
$R_{DS(ON)} \text{ Max}$	1.4 @ $V_{GS} = 10 \text{ V}$	Ω
$V_{GS(th)} \text{ typ}$	3	V
$Q_g \text{ typ}$	11 @ $V_{GS} = 10 \text{ V}$	nC

Application

- Offline Power Supply

Absolute Maximum Ratings(at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	900	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	I_D	2 1.4	A A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	7	A
Avalanche Current	I_{AS}	1.5	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	97	mJ
Total Power Dissipation	P_{tot}	12.5	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	10	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	50	$^\circ\text{C/W}$

¹⁾ Pulse Test: Pulse Width $\leq 100 \mu\text{s}$, Duty Cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.

²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 86 \text{ mH}$, $R_g = 25 \Omega$, $I_D = 1.5 \text{ A}$, $V_{GS} = 10 \text{ V}$.

³⁾ Device Surface Mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate, in a still air.

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 1\text{ mA}$	BV_{DSS}	900	-	-	V
Drain-Source Leakage Current at $V_{DS} = 900\text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 20\text{ V}$	I_{GSS}	-	-	± 1	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = 150\text{ }\mu\text{A}$	$V_{GS(th)}$	2	-	4	V
Drain-Source On-State Resistance at $V_{GS} = 10\text{ V}$, $I_D = 0.9\text{ A}$	$R_{DS(on)}$	-	1.1	1.4	Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $V_{DS} = 5\text{ V}$, $I_D = 0.9\text{ A}$	g_{fs}	-	2	-	S
Gate Resistance at $V_{GS} = 0\text{ V}$, $V_{DS} = 0\text{ V}$, $f = 1\text{ MHz}$	R_g	-	4.9	-	Ω
Input Capacitance at $V_{GS} = 0\text{ V}$, $V_{DS} = 450\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	457	-	pF
Output Capacitance at $V_{GS} = 0\text{ V}$, $V_{DS} = 450\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	11.4	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0\text{ V}$, $V_{DS} = 450\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	2	-	pF
Gate charge total at $V_{DS} = 450\text{ V}$, $I_D = 2\text{ A}$, $V_{GS} = 10\text{ V}$	Q_g	-	11	-	nC
Gate to Source Charge at $V_{DS} = 450\text{ V}$, $I_D = 2\text{ A}$, $V_{GS} = 10\text{ V}$	Q_{gs}	-	3	-	nC
Gate to Drain Charge at $V_{DS} = 450\text{ V}$, $I_D = 2\text{ A}$, $V_{GS} = 10\text{ V}$	Q_{gd}	-	3.6	-	nC
Turn-On Delay Time at $V_{DS} = 500\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 2\text{ A}$, $R_g = 24\text{ }\Omega$	$t_{d(on)}$	-	26	-	ns
Turn-On Rise Time at $V_{DS} = 500\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 2\text{ A}$, $R_g = 24\text{ }\Omega$	t_r	-	21	-	ns
Turn-Off Delay Time at $V_{DS} = 500\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 2\text{ A}$, $R_g = 24\text{ }\Omega$	$t_{d(off)}$	-	25	-	ns
Turn-Off Fall Time at $V_{DS} = 500\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 2\text{ A}$, $R_g = 24\text{ }\Omega$	t_f	-	98	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_S = 2\text{ A}$, $V_{GS} = 0\text{ V}$	V_{SD}	-	-	1.3	V
Body-Diode Continuous Current	I_S	-	-	2	A
Body-Diode Continuous Current, Pulsed	I_{SM}	-	-	7	A
Body Diode Reverse Recovery Time at $I_S = 2\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	222	-	ns
Body Diode Reverse Recovery Charge at $I_S = 2\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	1.6	-	μC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

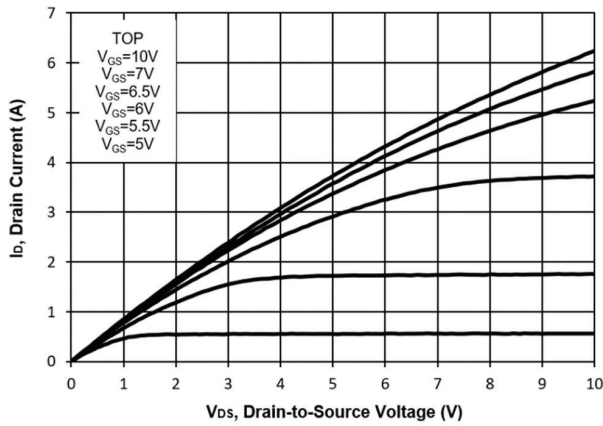


Fig. 2 Typical Transfer Characteristics

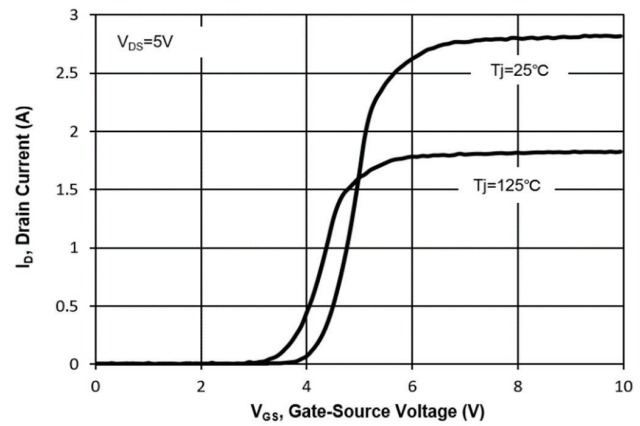


Fig. 3 On-Resistance vs. Drain Current

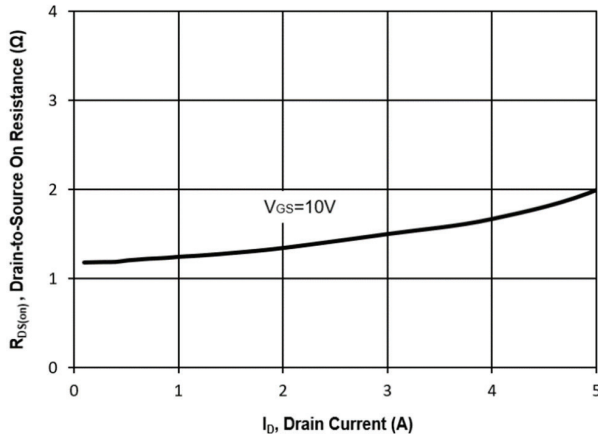


Fig. 4 On-Resistance vs. Gate-Source Voltage

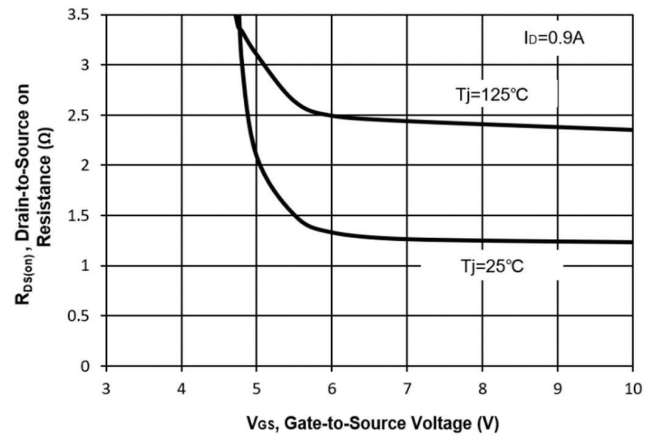


Fig. 5 On-Resistance vs. Tj

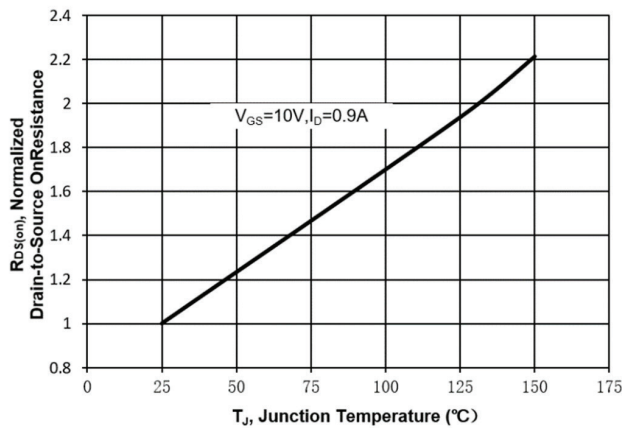
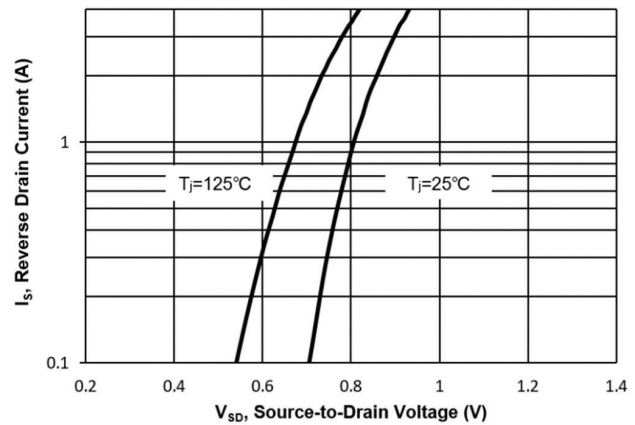


Fig. 6 Typical Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

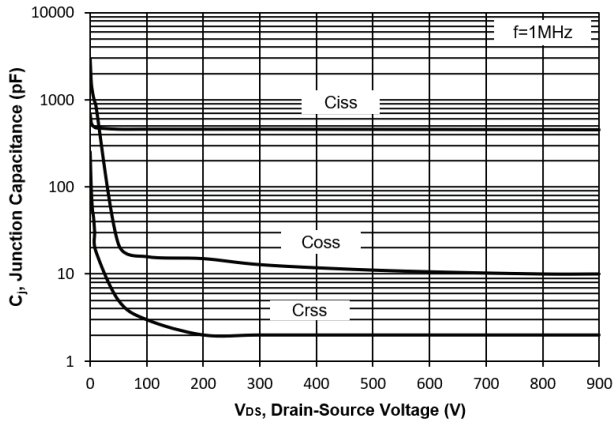


Fig. 8 Drain-Source Leakage Current vs. T_J

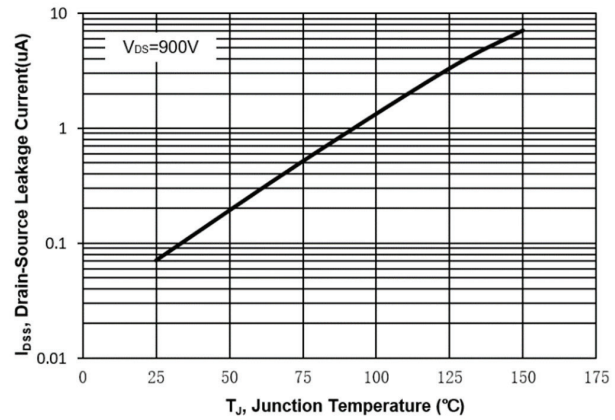


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

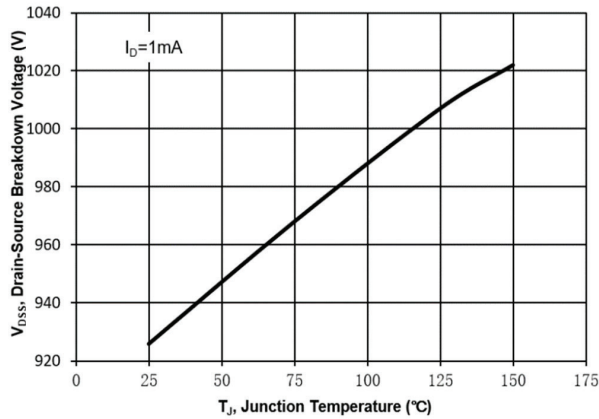


Fig. 10 Gate Threshold Variation vs. T_J

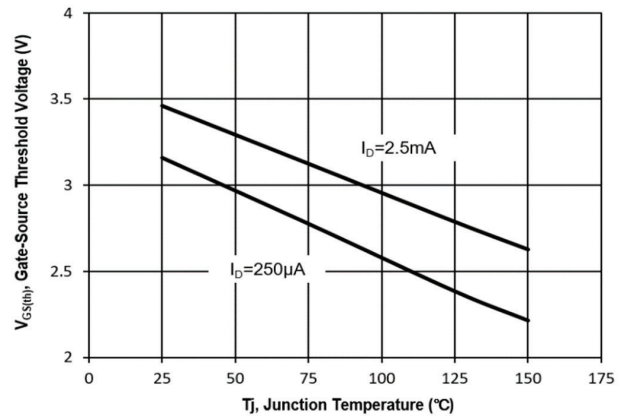


Fig. 11 Gate Charge

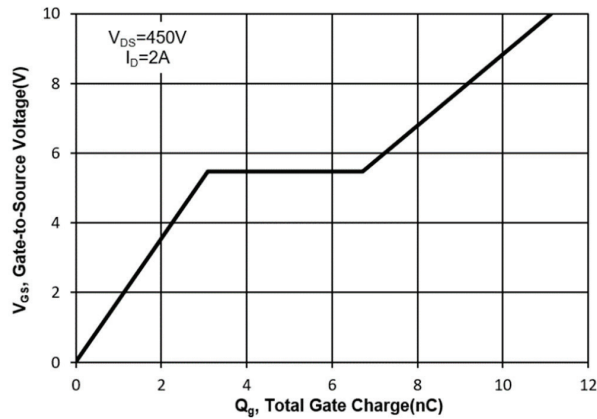


Fig. 12 Safe Operation Area

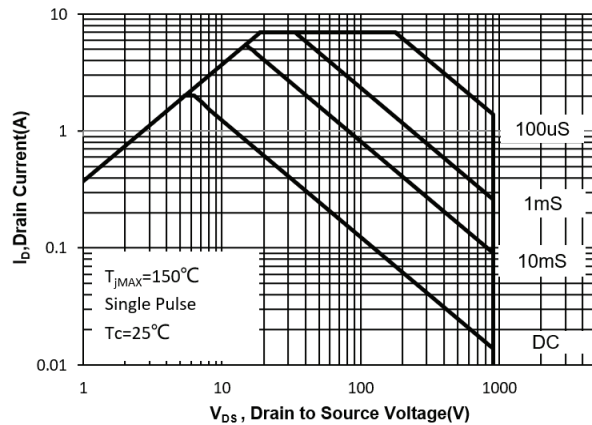


Fig.13 Normalized maximum transient thermal impedance($z_{\theta JC}$)

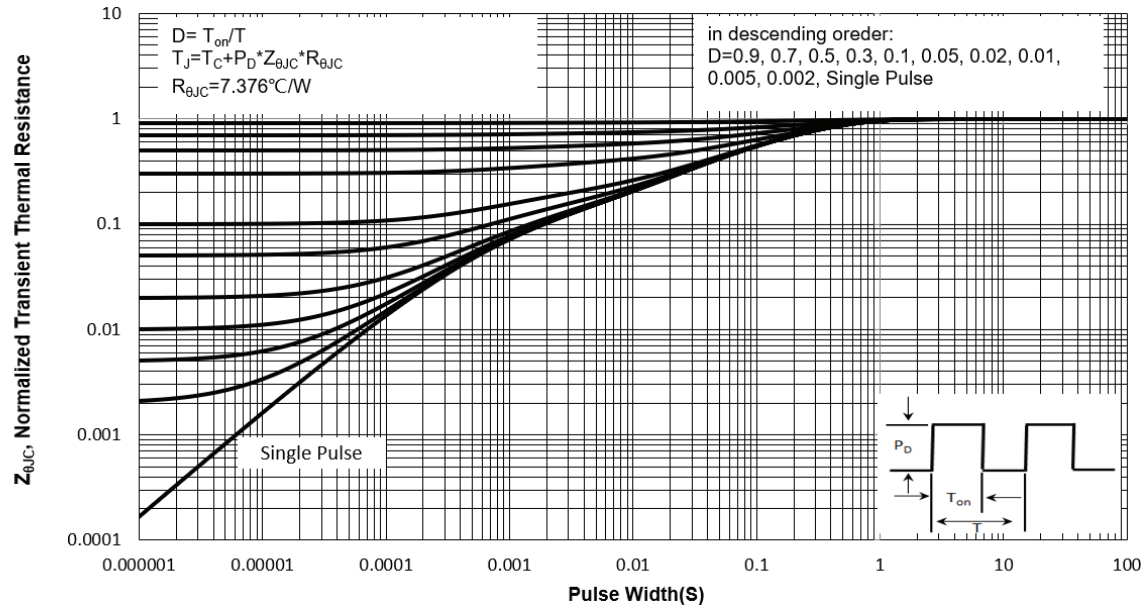
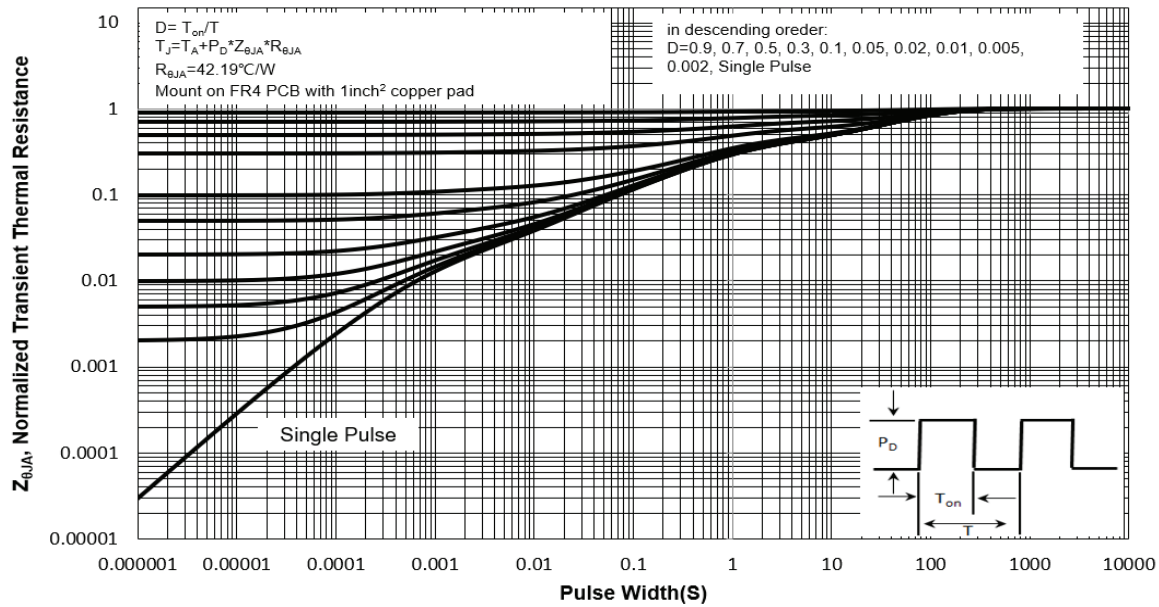


Fig.14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

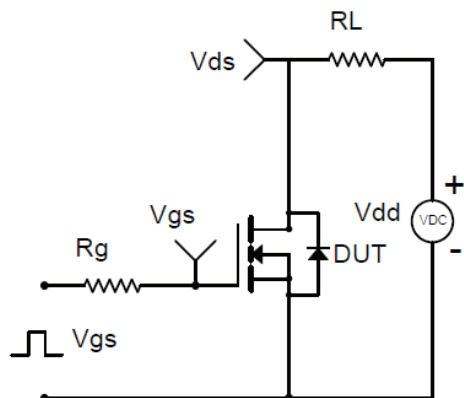


Fig.1-2 Switching Waveform

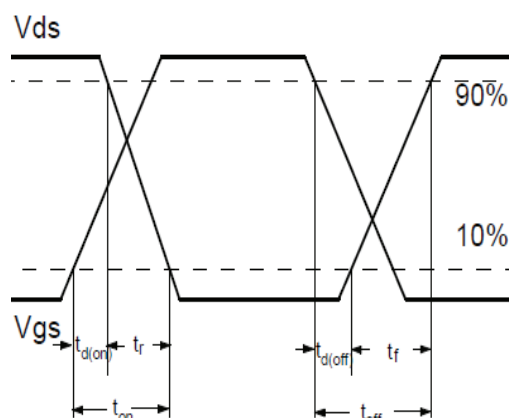


Fig.2-1 Gate charge test circuit

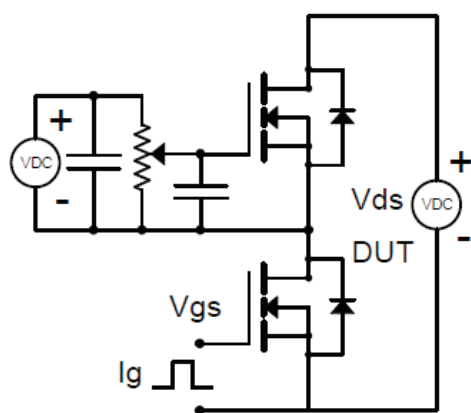


Fig.2-2 Gate charge waveform

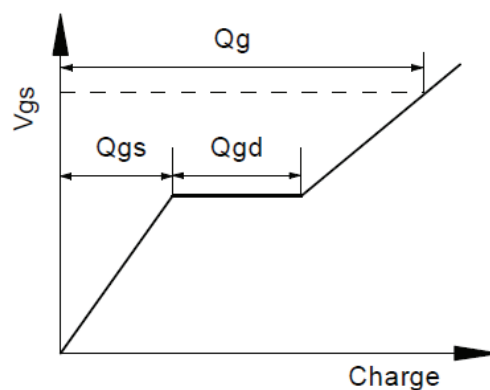


Fig.3-1 Avalanche test circuit

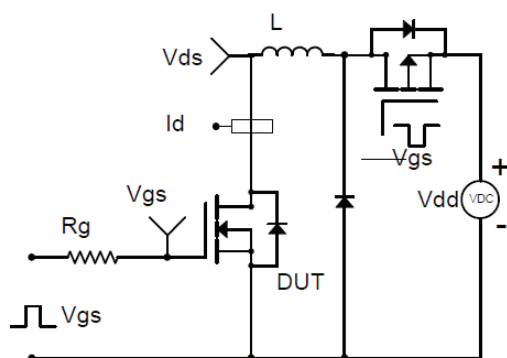
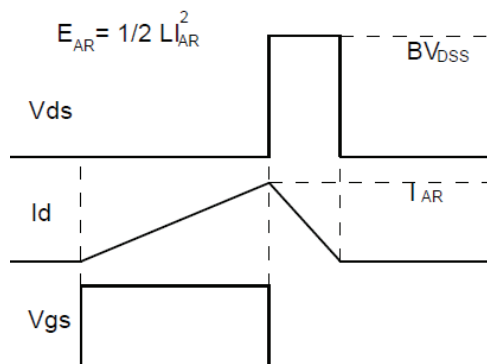
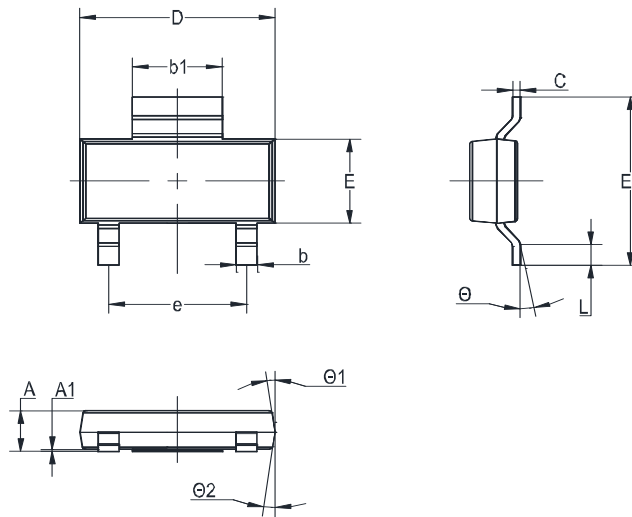
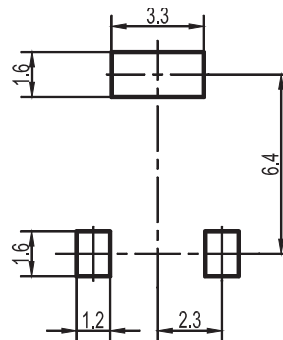


Fig.3-2 Avalanche waveform



PACKAGE OUTLINE (Dimensions in mm)
SOT-223-2


Unit	A	A1	b	b1	C	D	E	E1	e	L	Θ	Θ1	Θ2
mm	1.8 1.5	0.1 MAX	0.8 0.6	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	7.3 6.7	4.6 TYP	1.1 0.7	10° 0°	7° 0°	7° 0°

Recommended Soldering Footprint

Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-223-2	12	8 ± 0.1	0.315 ± 0.004	330	13	3,000

Marking information

" PDQ90N1K5K " = Part No

" ***** " = Date Code Marking

Font type: Arial



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