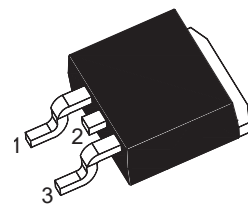
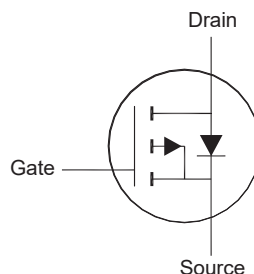


P-Channel Enhancement Mode MOSFET

Features

- Low On-Resistance
- Surface-mounted package
- Halogen and Antimony Free(HAF), RoHS compliant



1.Gate 2.Drain 3.Source
TO-263 Plastic Package

Key Parameters

Parameter	Value	Unit
$-BV_{DS}$	40	V
$R_{DS(ON)}$ Max	7.2 @ $-V_{GS} = 10$ V	m Ω
	9.7 @ $-V_{GS} = 4.5$ V	
$-V_{GS(th)}$ typ	1.6	V
Q_g typ	141 @ $-V_{GS} = 10$ V	nC

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	$-I_D$	110	A
		69	
Peak Drain Current, Pulsed ¹⁾	$-I_{DM}$	400	A
Single-Pulse Avalanche Current	$-I_{AS}$	63	A
Single-Pulse Avalanche Energy ²⁾	E_{AS}	198.5	mJ
Power Dissipation	P_{tot}	125	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	$R_{\theta JC}$	1	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	40	$^\circ\text{C/W}$

¹⁾ Pulse Test: Pulse Width ≤ 100 μs , 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 $T_J = 25^\circ\text{C}$, $L = 0.1$ mH, $R_g = 25$ Ω , $-I_{AS} = 63$ A, $V_{GS} = 10$ V.

³⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in 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 $-I_D = 1\text{ mA}$	$-BV_{DSS}$	40	-	-	V
Drain-Source Leakage Current at $-V_{DS} = 32\text{ V}$	$-I_{DSS}$	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 16\text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250\text{ }\mu\text{A}$	$-V_{GS(th)}$	1	-	2.5	V
Drain-Source On-State Resistance at $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$ at $-V_{GS} = 4.5\text{ V}$, $-I_D = 10\text{ A}$	$R_{DS(on)}$	- -	5.7 -	7.2 9.7	$\text{m}\Omega$
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS} = 5\text{ V}$, $-I_D = 10\text{ A}$	g_{FS}	-	38	-	S
Gate Resistance at $V_{GS} = 0\text{ V}$, $V_{DS} = 0\text{ V}$, $f = 1\text{ MHz}$	R_g	-	1.6	-	Ω
Input Capacitance at $-V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	7815	-	pF
Output Capacitance at $-V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	552	-	pF
Reverse Transfer Capacitance at $-V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	406	-	pF
Total Gate Charge at $-V_{DS} = 20\text{ V}$, $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$ at $-V_{DS} = 20\text{ V}$, $-V_{GS} = 4.5\text{ V}$, $-I_D = 20\text{ A}$	Q_g	- -	141 67	- -	nC
Gate-Source Charge at $-V_{DS} = 20\text{ V}$, $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$	Q_{gs}	-	28.5	-	nC
Gate-Drain Charge at $-V_{DS} = 20\text{ V}$, $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$	Q_{gd}	-	24.5	-	nC
Turn-On Delay Time at $-V_{DD} = 20\text{ V}$, $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$, $R_g = 3.3\text{ }\Omega$	$t_{d(on)}$	-	42	-	ns
Turn-On Rise Time at $-V_{DD} = 20\text{ V}$, $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$, $R_g = 3.3\text{ }\Omega$	t_r	-	51	-	ns
Turn-Off Delay Time at $-V_{DD} = 20\text{ V}$, $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$, $R_g = 3.3\text{ }\Omega$	$t_{d(off)}$	-	49	-	ns
Turn-Off Fall Time at $-V_{DD} = 20\text{ V}$, $-V_{GS} = 10\text{ V}$, $-I_D = 20\text{ A}$, $R_g = 3.3\text{ }\Omega$	t_f	-	10	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S = 1\text{ A}$, $V_{GS} = 0\text{ V}$	$-V_{SD}$	-	-	1.2	V
Body-Diode Continuous Current	$-I_S$	-	-	110	A
Body-Diode Continuous Current, Pulsed	$-I_{SM}$	-	-	400	A
Body Diode Reverse Recovery Time at $-I_S = 20\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	29	-	ns
Body Diode Reverse Recovery Charge at $-I_S = 20\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	33	-	nC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

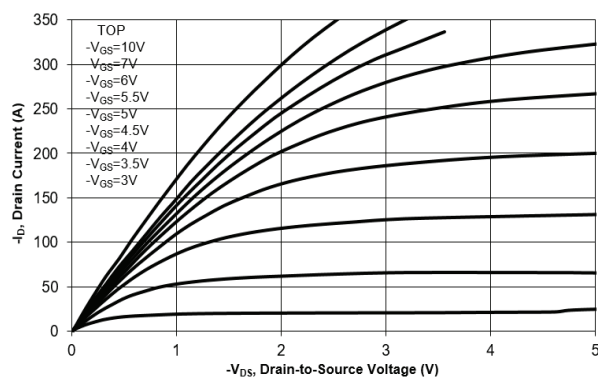


Fig. 2 Typical Transfer Characteristics

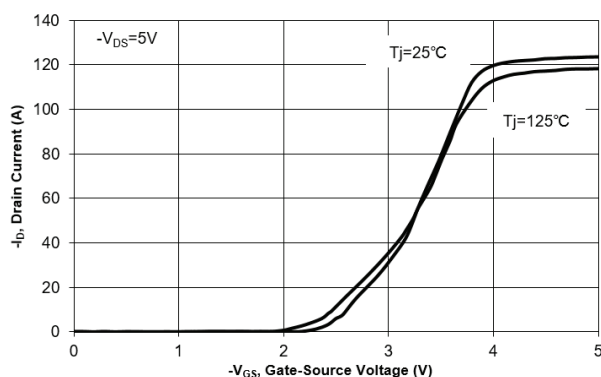


Fig. 3 On-Resistance vs. Drain Current

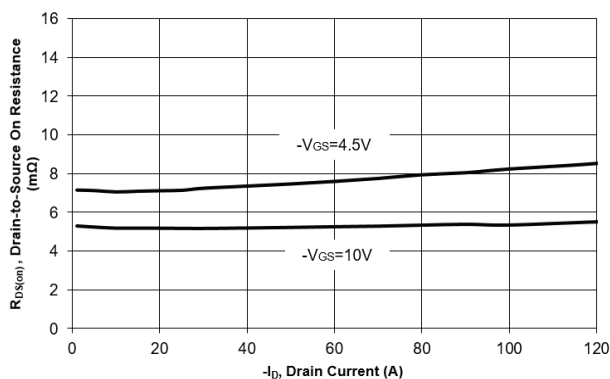


Fig. 4 On-Resistance vs. Gate to Source Voltage

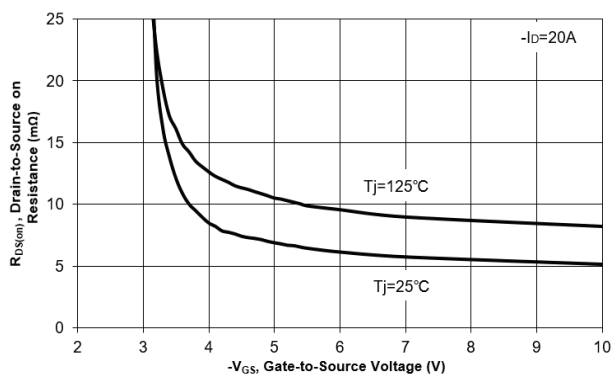


Fig. 5 On-Resistance vs. T_j

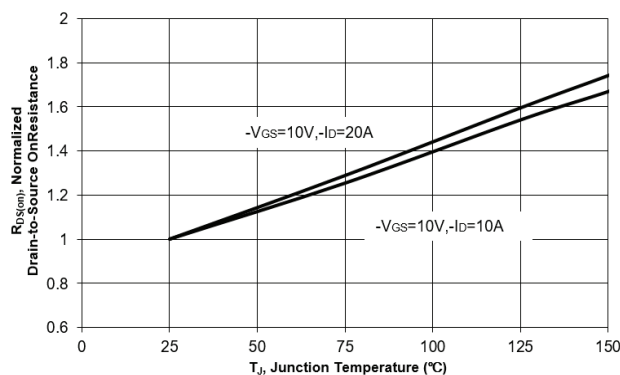
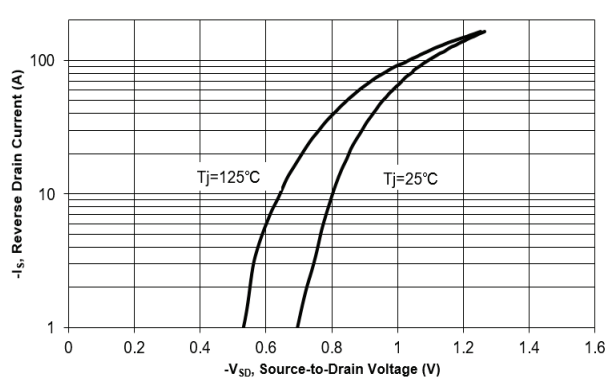


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

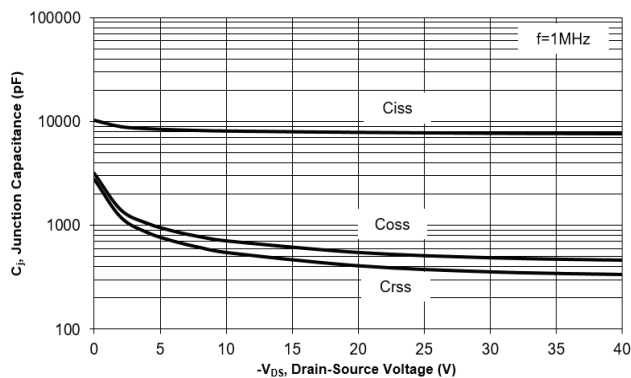


Fig. 8 Drain-Source Leakage Current vs. T_j

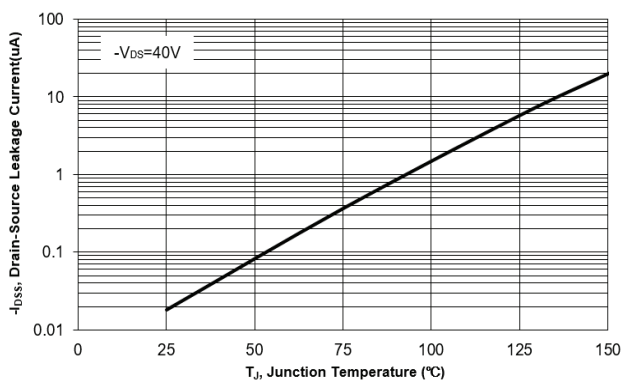


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

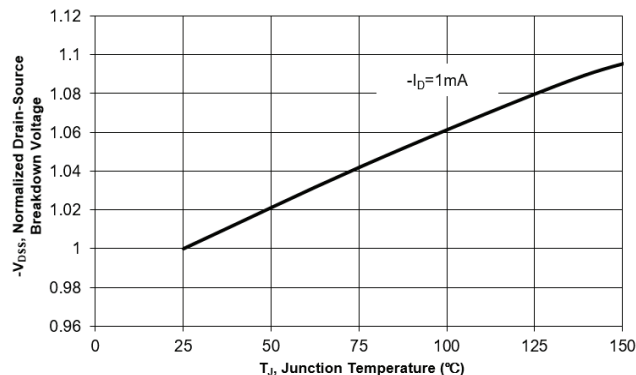


Fig. 10 Gate Threshold Variation vs. T_j

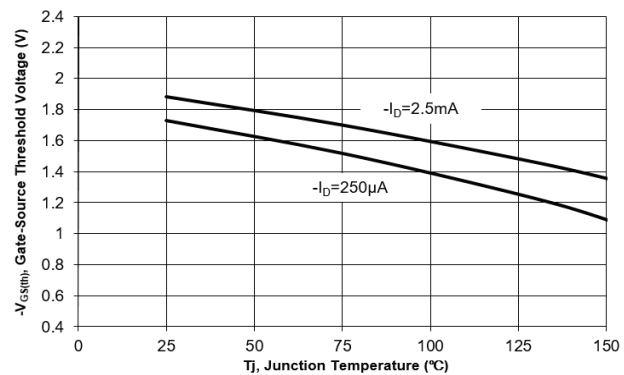


Fig. 11 Gate Charge

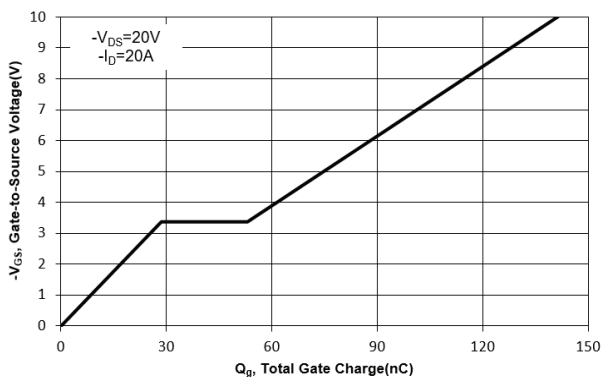
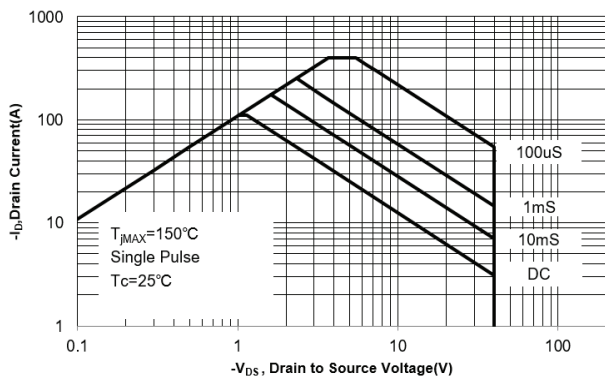


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

Fig. 13 Normalized Maximum Transient Thermal Impedance($z_{\theta JC}$)

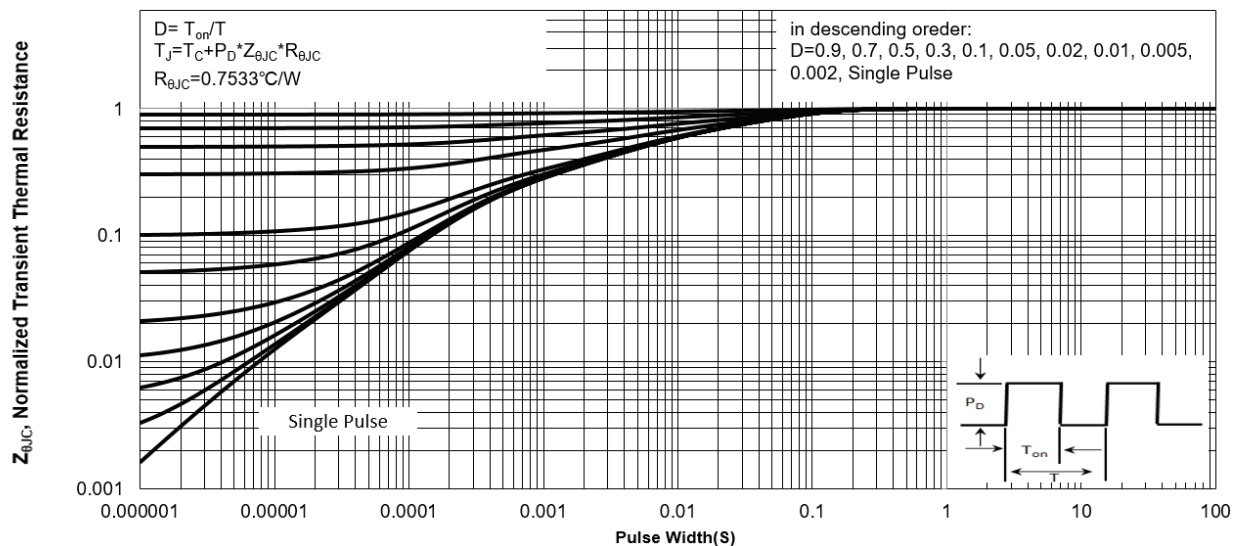
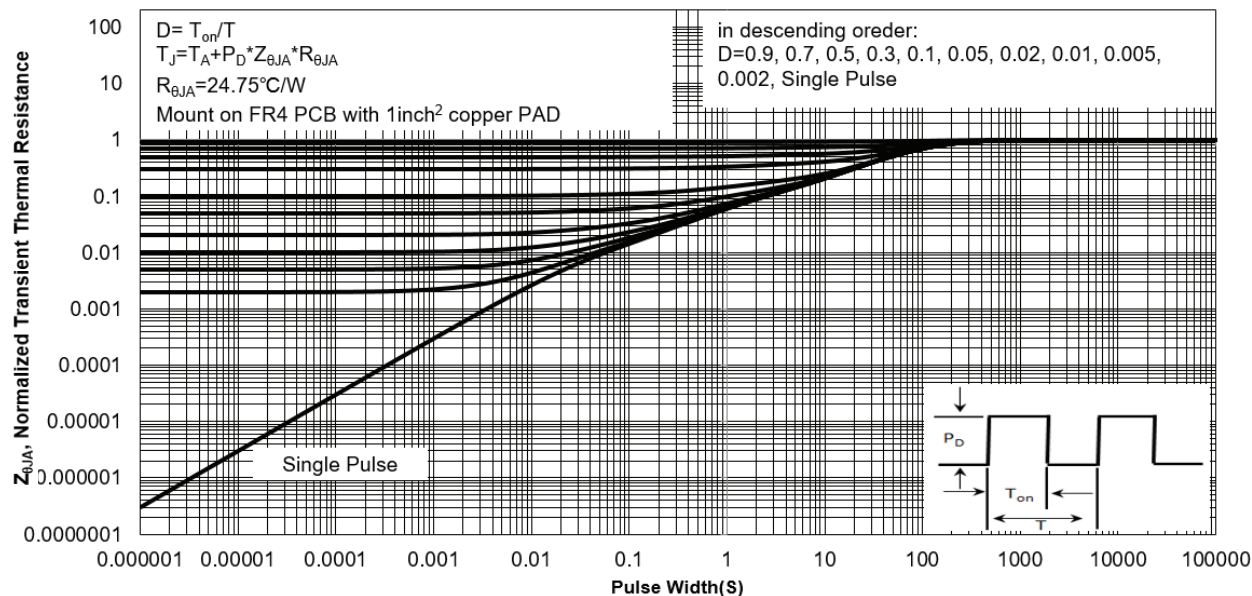


Fig. 14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

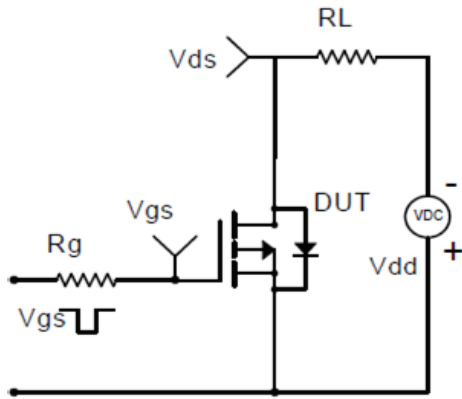


Fig.1-2 Switching Waveform

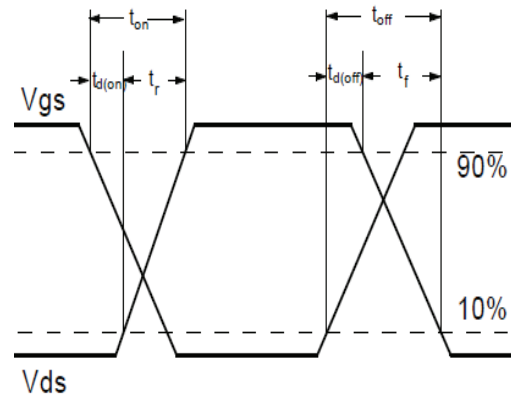


Fig.2-1 Gate charge test circuit

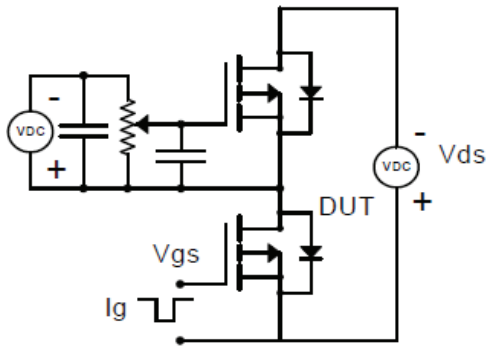


Fig.2-2 Gate charge waveform

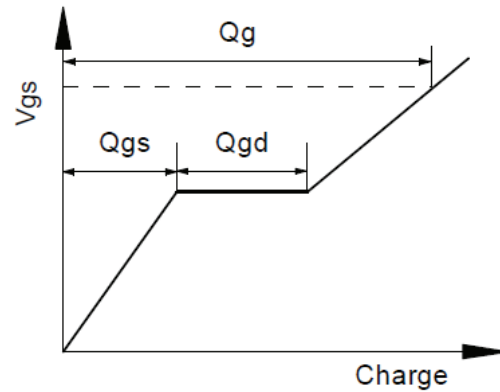


Fig.3-1 Avalanche test circuit

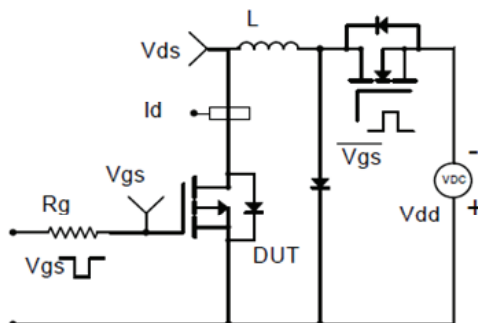
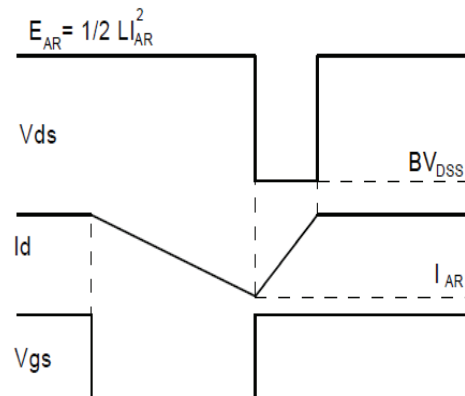
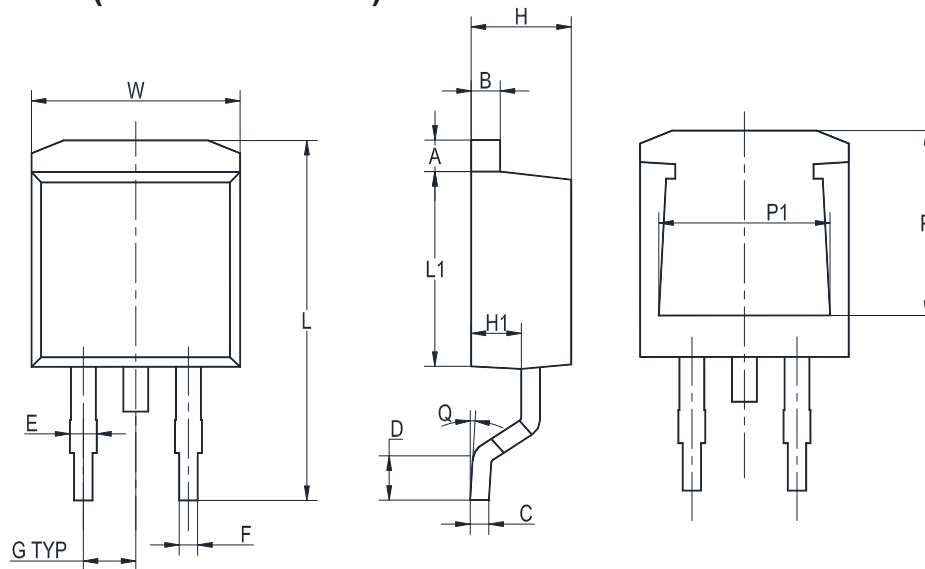
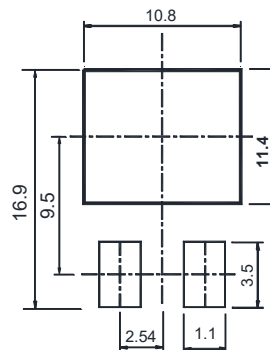


Fig.3-2 Avalanche waveform



Package Outline (Dimensions in mm)
TO-263


UNIT	A	B	C	D	E	F	G	W	H	H1	L	L1	Q	P	P1
mm	1.5	1.5	0.5	2.60	1.6	0.94	2.54	10.5	4.8	2.9	16.5	8.7	8°	7.6	8.2
	1.1	1.1	0.3	2.15	1.1	0.68	TYP	9.6	4.4	2.5	14.5	8.2	MAX	7.1	7.4

Recommended Soldering Footprint

Packing information

Package	Reel Quantity	Box Quantity	Carton Quantity	Delivery Mode
TO-263	0.8 K / Reel	0.8 K / Box	4K pcs / Carton	Reel

Marking information

" TV04P065LS " = Part No.

" ***** " = Date Code Marking

Font type: Arial



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