

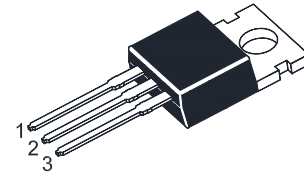
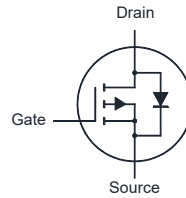
P-Channel Enhancement Mode MOSFET

Features

- Advanced trench cell design
- High speed switch
- Halogen and Antimony Free(HAF), RoHS compliant

Applications

- Portable appliances
- Battery management



1.Gate 2.Drain 3.Source
TO-220FB Plastic Package

Key Parameters

Parameter	Value	Unit
$-BV_{DS}$	100	V
$R_{DS(ON)}$ Max	68 @ $-V_{GS} = 10\text{ V}$	m Ω
	75 @ $-V_{GS} = 4.5\text{ V}$	
$-V_{GS(th)}$ typ	1.4	V
Q_g typ	71 @ $-V_{GS} = 10\text{ V}$	nC

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	$-I_D$	19	A
$T_c = 25^\circ\text{C}$		12	
$T_c = 100^\circ\text{C}$			
Peak Drain Current ¹⁾	$-I_{DM}$	70	A
Avalanche Current	$-I_{AS}$	30.8	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	47.4	mJ
Power Dissipation	P_D	61.5	W
$T_c = 25^\circ\text{C}$			
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	$R_{\theta JC}$	2	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	55	$^\circ\text{C/W}$

¹⁾ Pulse Test: Pulse Width $\leq 100\text{ }\mu\text{s}$, 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 $T_J = 25^\circ\text{C}$, $L = 0.1\text{ mH}$, $R_g = 25\text{ }\Omega$, $-I_{AS} = 30.8\text{ A}$, $-V_{GS} = 10\text{ V}$.

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

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $-I_D = 250\ \mu\text{A}$	$-BV_{DS}$	100	-	-	V
Drain-Source Leakage Current at $-V_{DS} = 80\ \text{V}$	$-I_{DSS}$	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 20\ \text{V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250\ \mu\text{A}$	$-V_{GS(th)}$	1	-	2.3	V
Drain-Source On-State Resistance at $-V_{GS} = 10\ \text{V}$, $-I_D = 10\ \text{A}$ at $-V_{GS} = 4.5\ \text{V}$, $-I_D = 8\ \text{A}$	$R_{DS(on)}$	- -	55 -	68 75	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS} = 5\ \text{V}$, $-I_D = 8\ \text{A}$	g_{fs}	-	25.2	-	S
Gate resistance at $V_{DS} = 0\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g	-	5.2	-	Ω
Input Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 50\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	4081	-	pF
Output Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 50\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	98	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 50\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	20	-	pF
Gate charge total at $-V_{DS} = 50\ \text{V}$, $-I_D = 10\ \text{A}$, $-V_{GS} = 10\ \text{V}$ at $-V_{DS} = 50\ \text{V}$, $-I_D = 10\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$	Q_g	- -	71 33	- -	nC
Gate to Source Charge at $-V_{DS} = 50\ \text{V}$, $-I_D = 10\ \text{A}$, $-V_{GS} = 10\ \text{V}$	Q_{gs}	-	13	-	nC
Gate to Drain Charge at $-V_{DS} = 50\ \text{V}$, $-I_D = 10\ \text{A}$, $-V_{GS} = 10\ \text{V}$	Q_{gd}	-	10	-	nC
Turn-On Delay Time at $-V_{DD} = 50\ \text{V}$, $-V_{GS} = 10\ \text{V}$, $-I_D = 10\ \text{A}$, $R_g = 3.3\ \Omega$	$t_{d(on)}$	-	21	-	ns
Turn-On Rise Time at $-V_{DD} = 50\ \text{V}$, $-V_{GS} = 10\ \text{V}$, $-I_D = 10\ \text{A}$, $R_g = 3.3\ \Omega$	t_r	-	46	-	ns
Turn-Off Delay Time at $-V_{DD} = 50\ \text{V}$, $-V_{GS} = 10\ \text{V}$, $-I_D = 10\ \text{A}$, $R_g = 3.3\ \Omega$	$t_{d(off)}$	-	52	-	ns
Turn-Off Fall Time at $-V_{DD} = 50\ \text{V}$, $-V_{GS} = 10\ \text{V}$, $-I_D = 10\ \text{A}$, $R_g = 3.3\ \Omega$	t_f	-	9	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S = 1\ \text{A}$, $V_{GS} = 0\ \text{V}$	$-V_{SD}$	-	-	1.3	V
Body-Diode Continuous Current	$-I_S$	-	-	19	A
Body-Diode Continuous Current, Pulsed	$-I_{SM}$	-	-	70	A
Body Diode Reverse Recovery Time at $-I_S = 10\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	t_{rr}	-	34	-	ns
Body Diode Reverse Recovery Charge at $-I_S = 10\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	Q_{rr}	-	64	-	nC

Fig. 1 Typical Output Characteristics

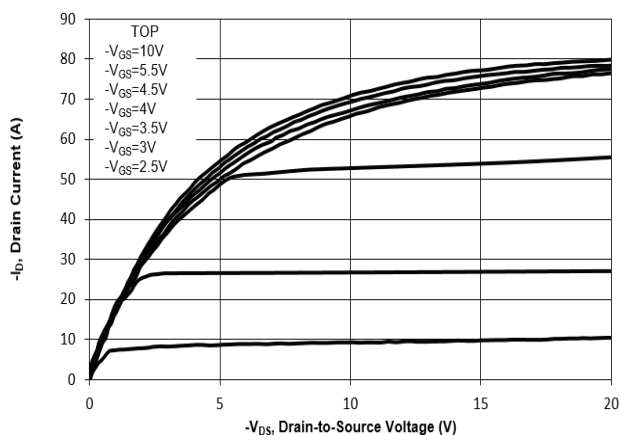


Fig. 2 Typical Transfer Characteristics

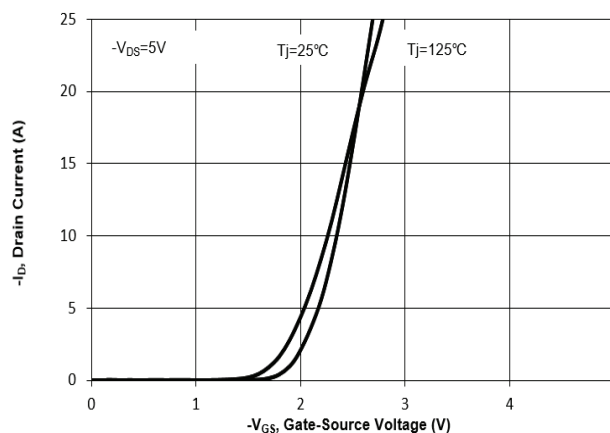


Fig. 3 On-Resistance vs. Drain Current

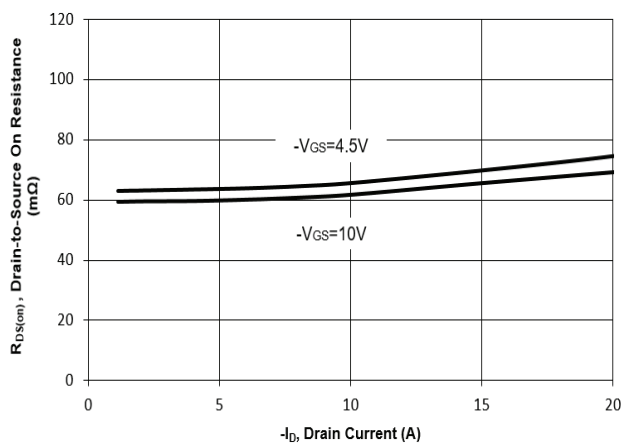


Fig. 4 On-Resistance vs. Gate to Source Voltage

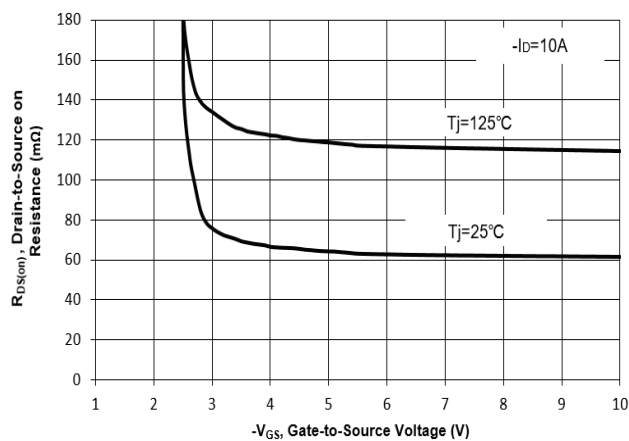


Fig. 5 On-Resistance vs. T_J

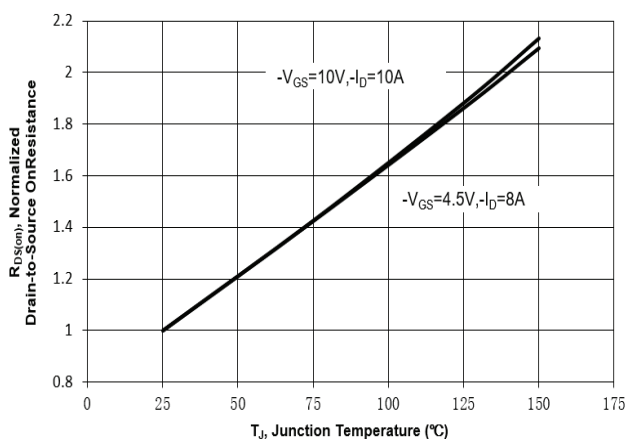
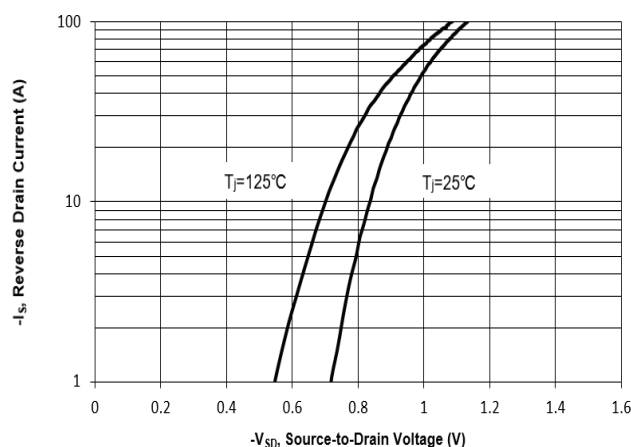


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

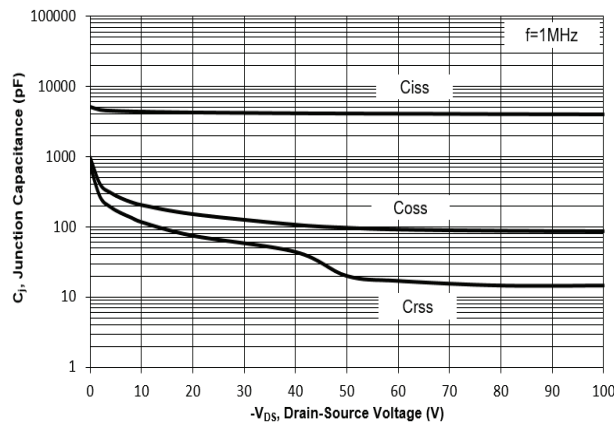


Fig. 8 Drain-Source Leakage Current vs. T_J

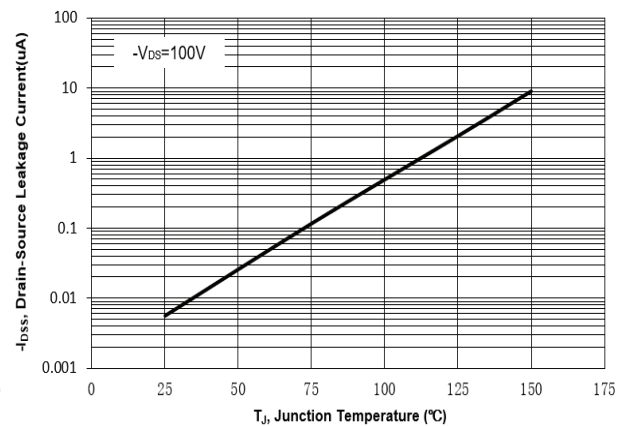


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

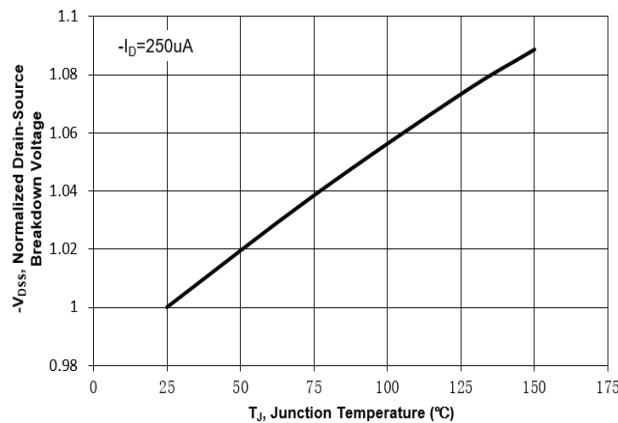


Fig. 10 Gate Threshold Variation vs. T_J

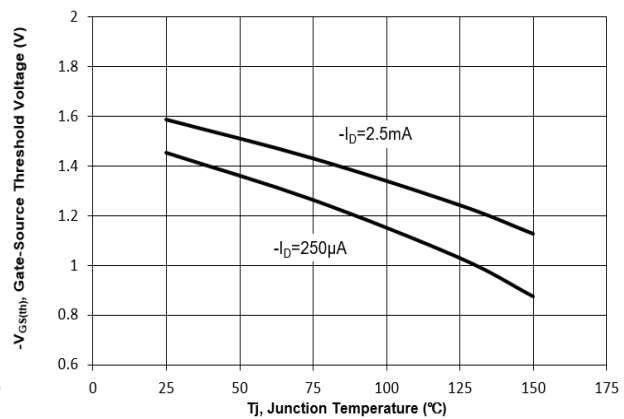


Fig. 11 Gate Charge

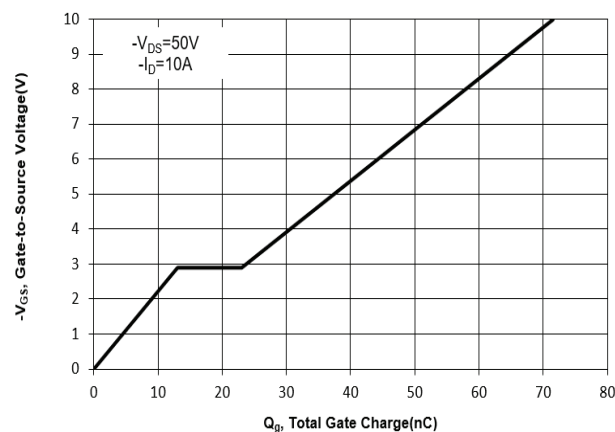
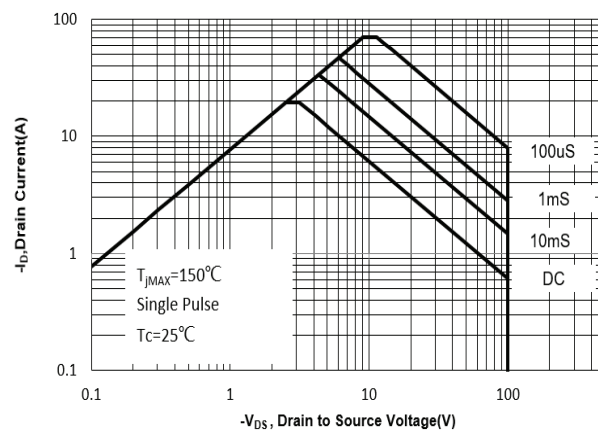


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

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

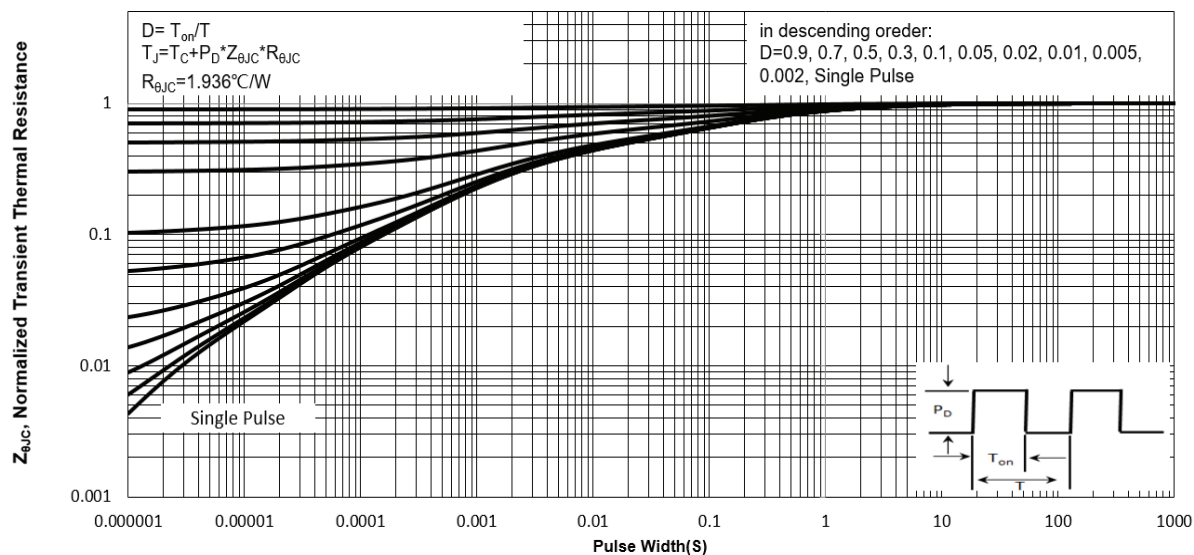
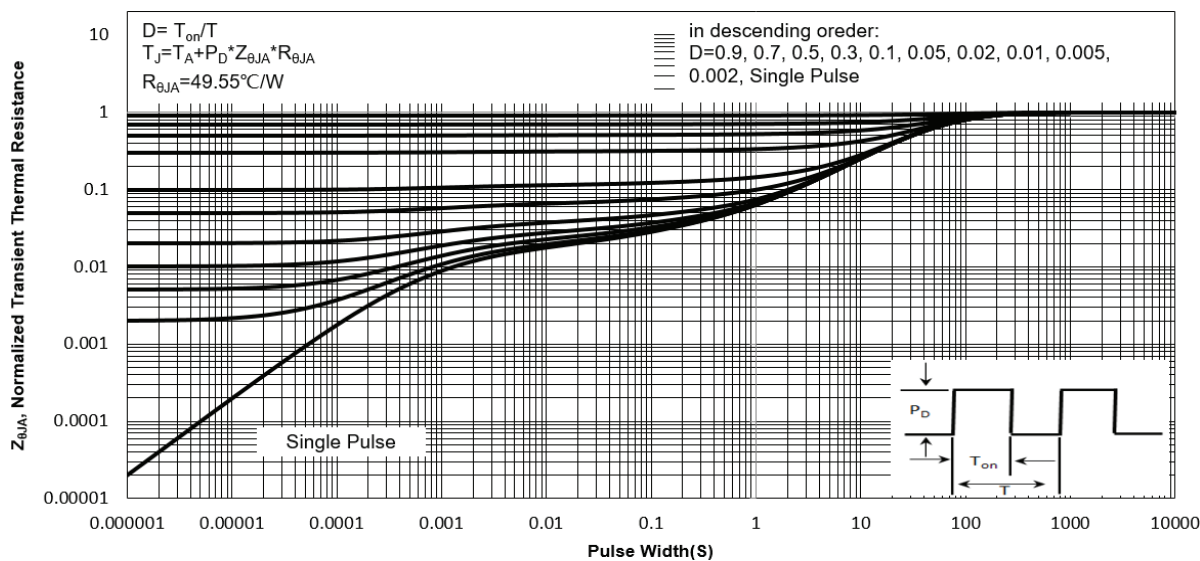


Fig. 14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

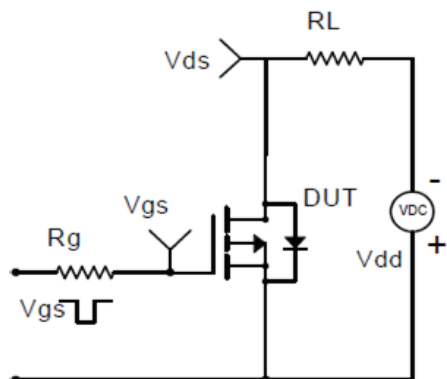


Fig.1-2 Switching Waveform

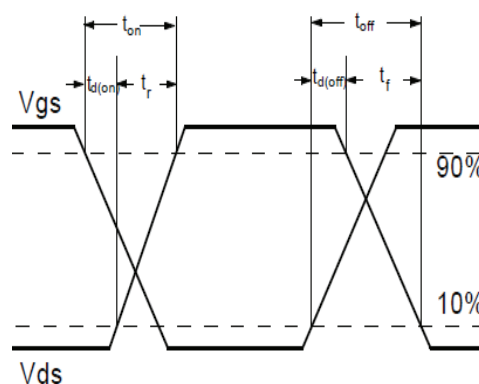


Fig.2-1 Gate charge test circuit

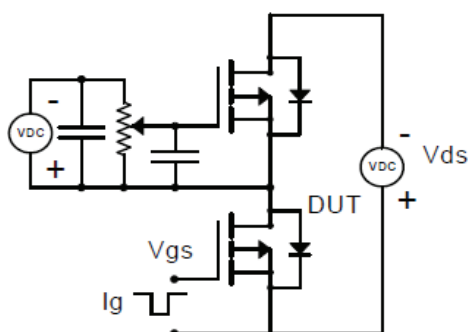


Fig.2-2 Gate charge waveform

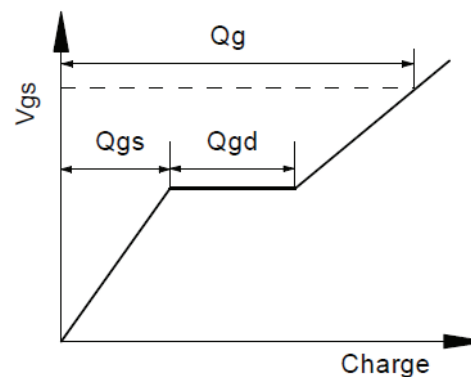


Fig.3-1 Avalanche test circuit

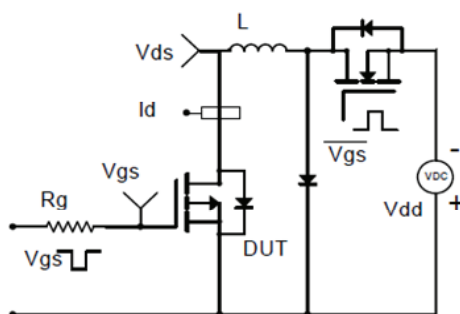
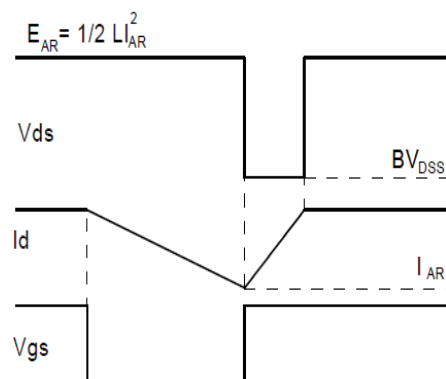
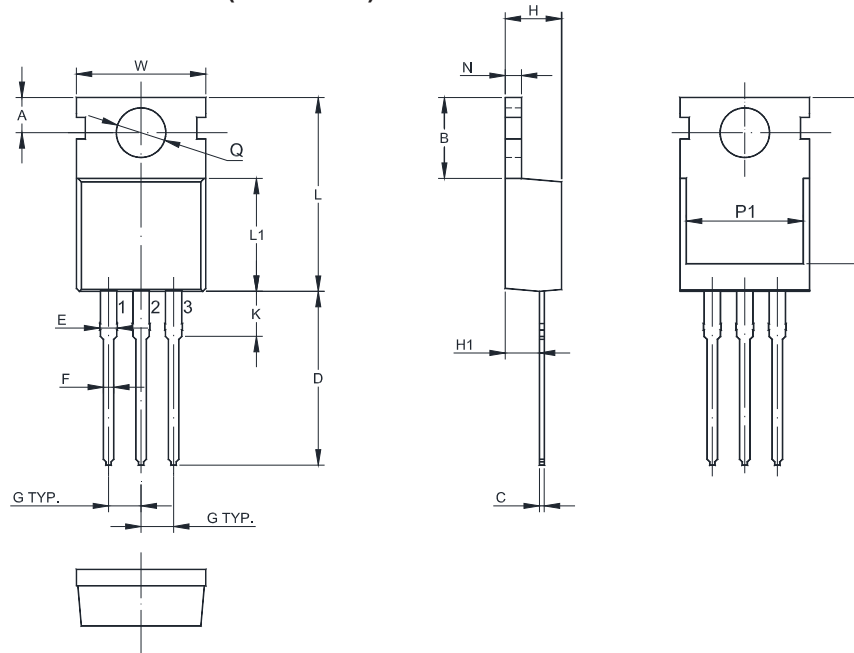


Fig.3-2 Avalanche waveform



Package Outline Dimensions (Units: mm)

TO-220FB



UNIT	A	B	C	D	E	F	G	W	H	H1	K	L	L1	N
mm	2.9	6.8	0.7	15	1.5	0.9	2.54	10.2	4.7	2.5	3.1	16.8	9.4	1.4
	2.7	6.4	0.3	11	1.1	0.7	TYP	9.8	4.3	2.2	2.7	14.8	9.0	1.2

UNIT	P	P1	Q
mm	13.3	8.2	3.7
	12.7	7.6	3.5

Packing information

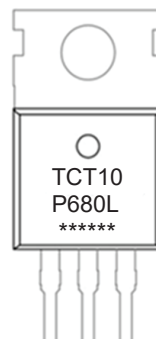
Package	Carton Quantity	Box Quantity	Base Quantity	Delivery Mode
TO-220FB	5 K / Carton	1 K / Box	50 pcs / Tube	Tube

Marking information

" TCT10P680L " = Part No.

" ***** " = Date Code Marking

Font type: Arial



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