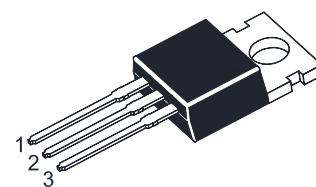
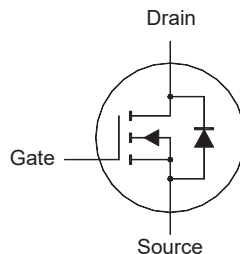


Features

- Fast switching speed
- Halogen and Antimony Free(HAF),
RoHS compliant

Applications

- Power converter



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

Key Parameters

Parameter	Value	Unit
BV_{DSS}	600	V
$R_{DS(ON)}$ Max	360 @ $V_{GS} = 10\text{ V}$	m Ω
$V_{GS(th)}$ typ	3.2	V
Q_g typ	20.4 @ $V_{GS} = 10\text{ V}$	nC

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current	I_D	12 7	A
		$T_c = 25^\circ\text{C}$ $T_c = 100^\circ\text{C}$	
Peak Drain Current, Pulsed ¹⁾	I_{DM}	30	A
Avalanche Current	I_{AS}	2.8	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	309	mJ
Power Dissipation	P_D	156.2	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	$R_{\theta JC}$	0.8	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	60	$^\circ\text{C/W}$

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 $T_J = 25^\circ\text{C}$, $L = 79\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 2.8\text{ A}$, $V_{GS} = 10\text{ V}$.

Characteristics at T_a = 25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at I _D = 250 μ A	BV _{DSS}	600	-	-	V
Drain-Source Leakage Current at V _{DS} = 480 V	I _{DSS}	-	-	1	μ A
Gate Leakage Current at V _{GS} = $\pm$ 30 V	I _{GSS}	-	-	$\pm$ 100	nA
Gate-Source Threshold Voltage at V _{DS} = V _{GS} , I _D = 250 μ A	V _{GSth}	2	-	4	V
Drain-Source On-State Resistance at V _{GS} = 10 V, I _D = 5.5 A	R _{DS(on)}	-	-	360	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at V _{DS} = 20 V, I _D = 5.5 A	g _{fs}	-	5.6	-	S
Gate Resistance at V _{GS} = 0 V, V _{DS} = 0 V, f = 1 MHz	R _g	-	3.3	-	Ω
Input Capacitance at V _{GS} = 0 V, V _{DS} = 300 V, f = 1 MHz	C _{iss}	-	629	-	pF
Output Capacitance at V _{GS} = 0 V, V _{DS} = 300 V, f = 1 MHz	C _{oss}	-	34	-	pF
Reverse Transfer Capacitance at V _{GS} = 0 V, V _{DS} = 300 V, f = 1 MHz	C _{rss}	-	6.8	-	pF
Total Gate Charge at V _{GS} = 10 V, V _{DS} = 300 V, I _D = 5.5 A	Q _g	-	20.4	-	nC
Gate Source Charge at V _{GS} = 10 V, V _{DS} = 300 V, I _D = 5.5 A	Q _{gs}	-	4.2	-	nC
Gate Drain Charge at V _{GS} = 10 V, V _{DS} = 300 V, I _D = 5.5 A	Q _{gd}	-	9.6	-	nC
Turn-On Delay Time at V _{GS} = 10 V, V _{DD} = 300 V, I _D = 5.5 A, R _G = 24 Ω	t _{d(on)}	-	30	-	ns
Turn-On Rise Time at V _{GS} = 10 V, V _{DD} = 300 V, I _D = 5.5 A, R _G = 24 Ω	t _r	-	15	-	ns
Turn-Off Delay Time at V _{GS} = 10 V, V _{DD} = 300 V, I _D = 5.5 A, R _G = 24 Ω	t _{d(off)}	-	30	-	ns
Turn-Off Fall Time at V _{GS} = 10 V, V _{DD} = 300 V, I _D = 5.5 A, R _G = 24 Ω	t _f	-	33	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at I _S = 11 A, V _{GS} = 0 V	V _{SD}	-	-	1.4	V
Body-Diode Continuous Current	I _S	-	-	12	A
Body-Diode Continuous Current, Pulsed	I _{SM}	-	-	30	A
Body Diode Reverse Recovery Time at I _S = 5.5 A, di/dt = 100 A / μ s	t _{rr}	-	311	-	ns
Body Diode Reverse Recovery Charge at I _S = 5.5 A, di/dt = 100 A / μ s	Q _{rr}	-	2.6	-	μ C

Electrical characteristic curves

Fig. 1 Typical Output Characteristics

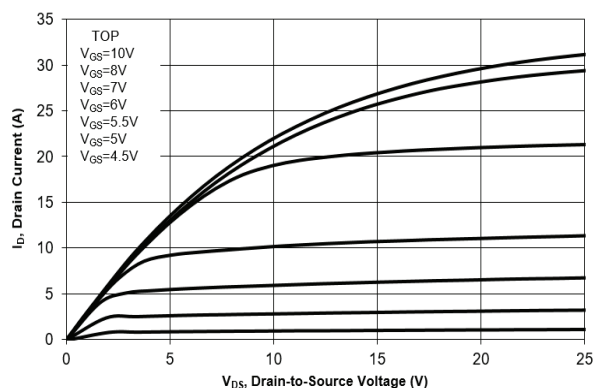


Fig. 2 Typical Transfer Characteristics

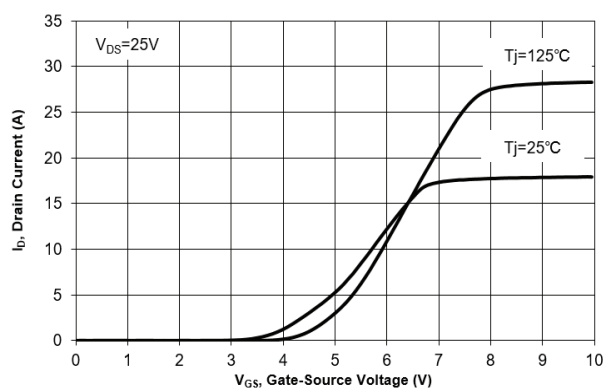


Fig. 3 on-Resistance vs. Drain Current

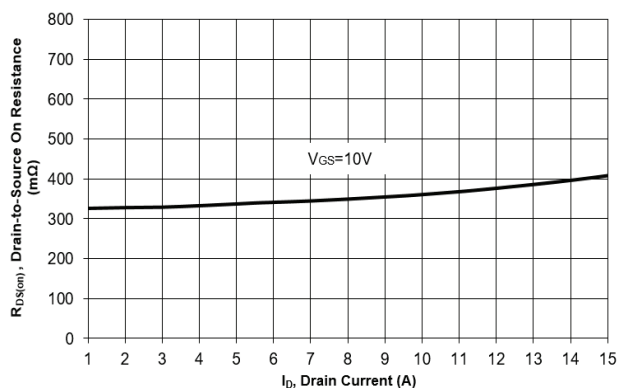


Fig. 4 on-Resistance vs. Gate to Source Voltage

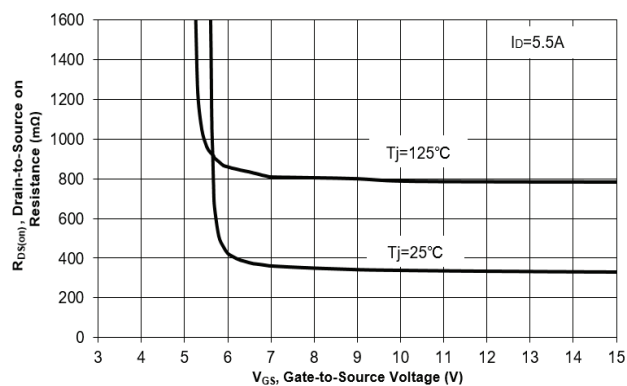


Fig. 5 on-Resistance vs. T_J

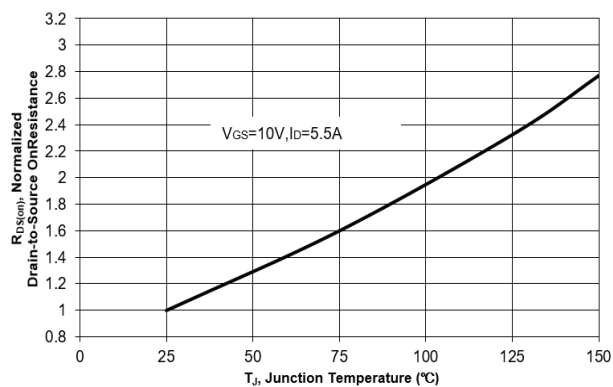


Fig. 6 Typical Body-Diode Forward Characteristics

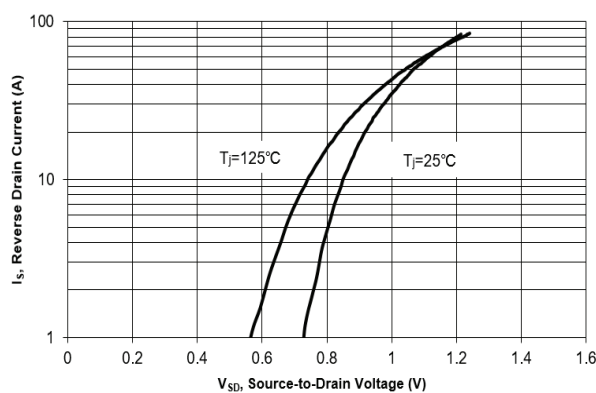


Fig. 7 Typical Junction Capacitance

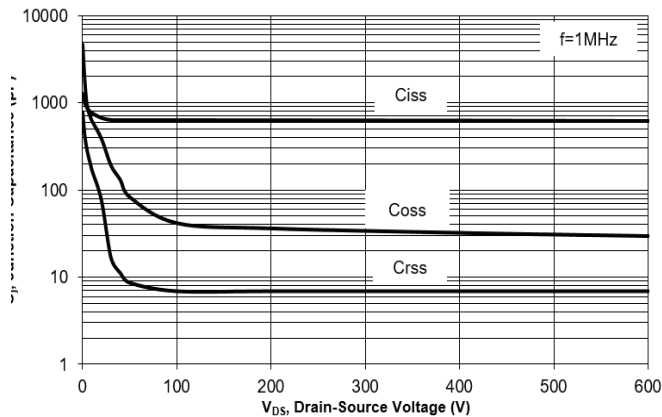


Fig. 8 Drain-Source Leakage Current vs. T_J

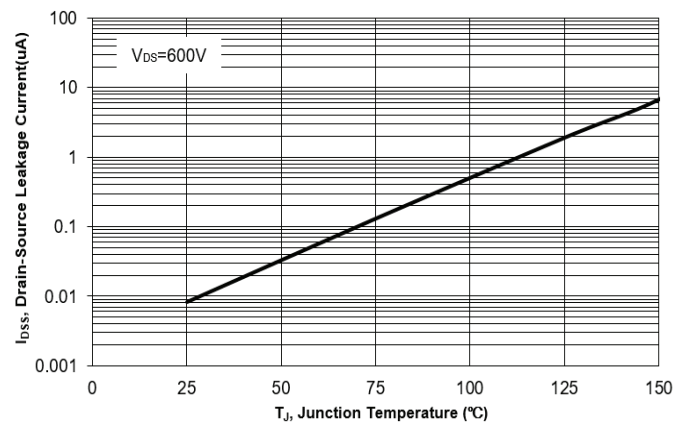


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

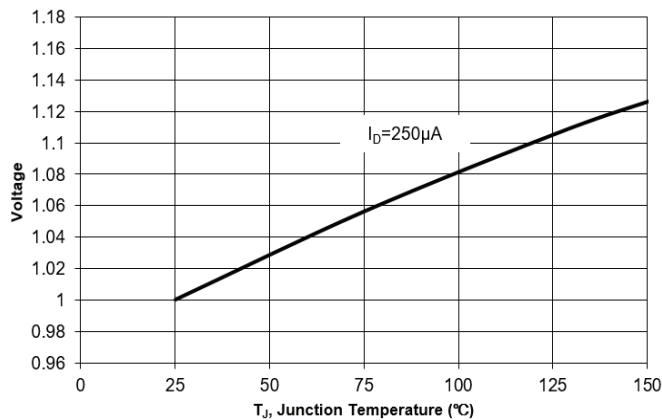


Fig. 10 Gate Threshold Variation vs. T_J

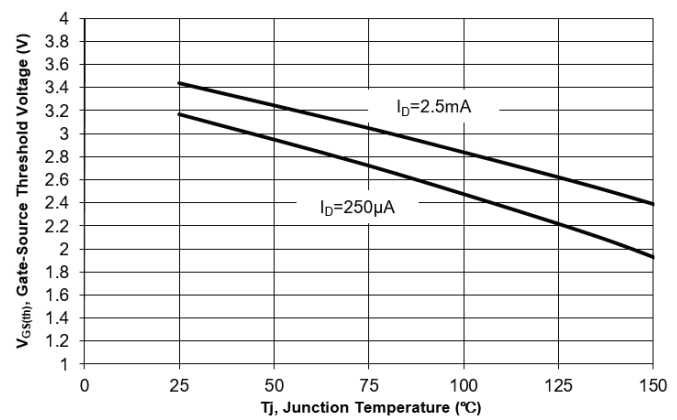


Fig. 11 Gate Charge

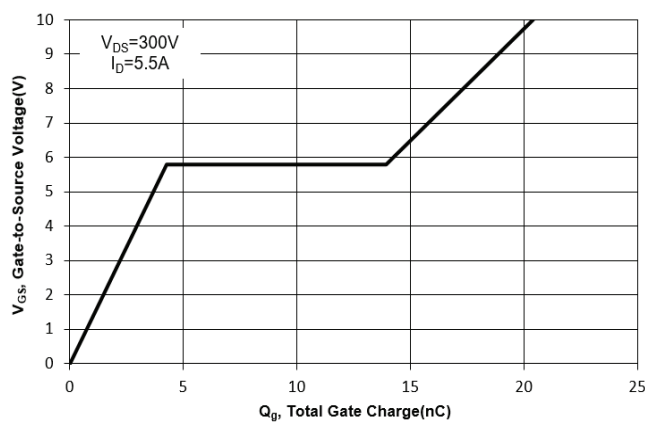
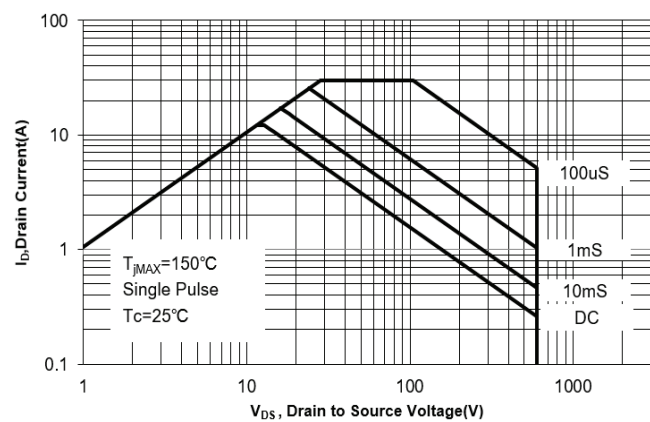


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

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

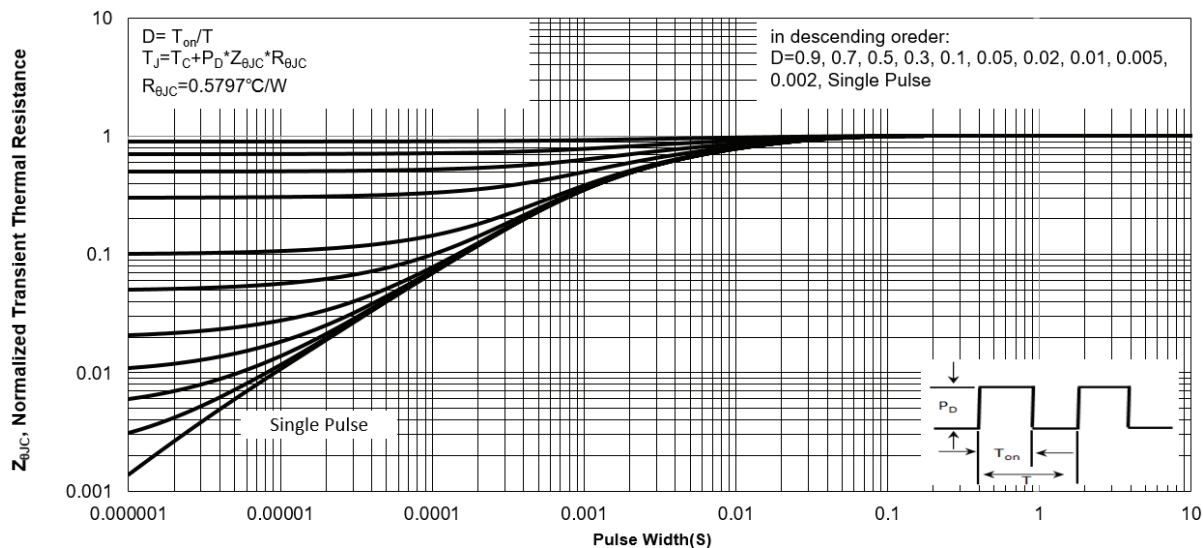
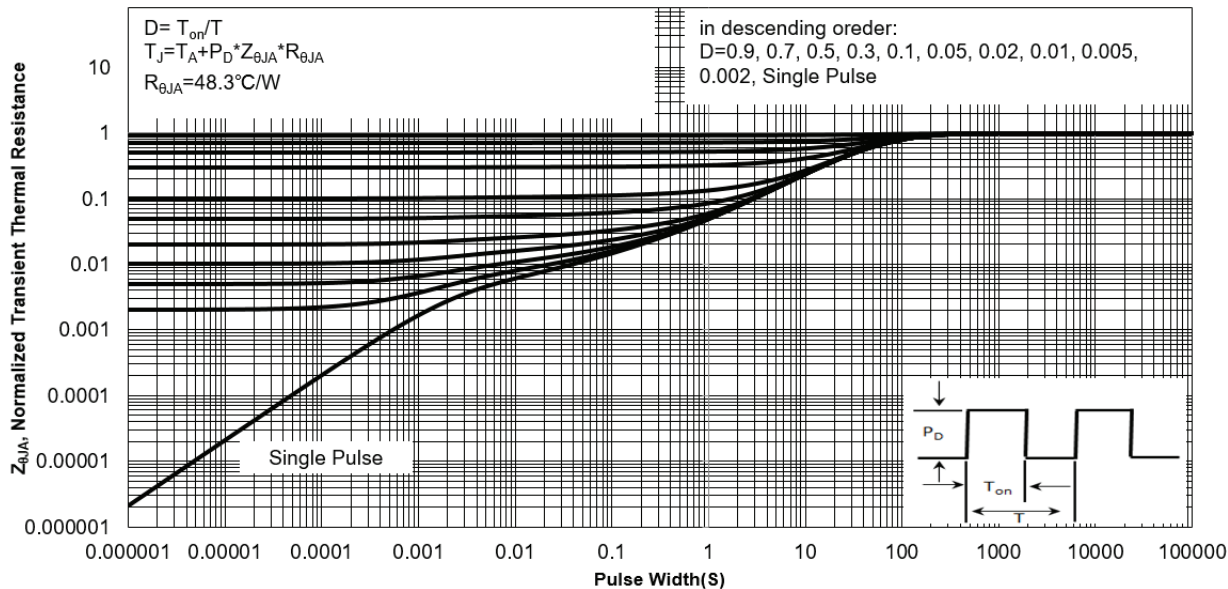
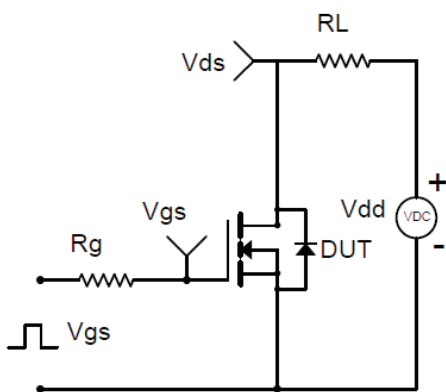
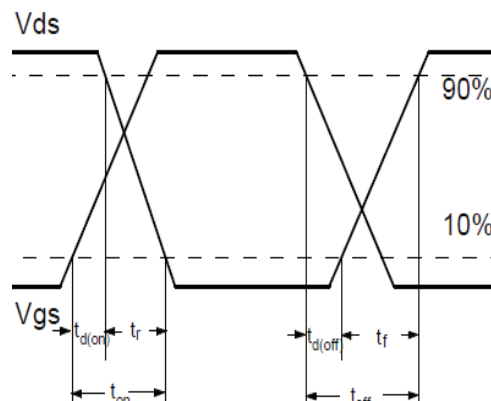
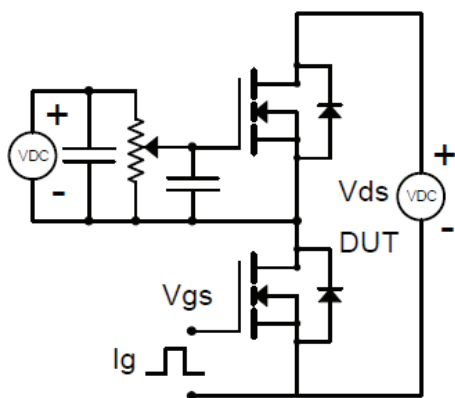
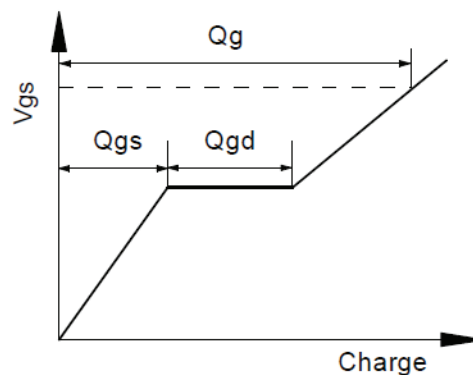
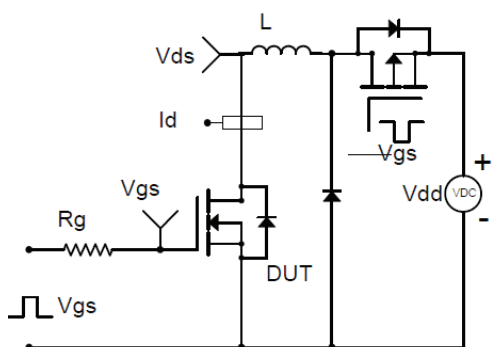
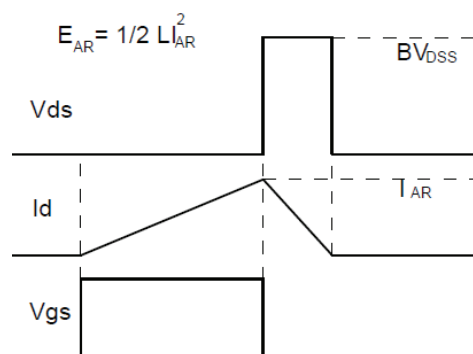


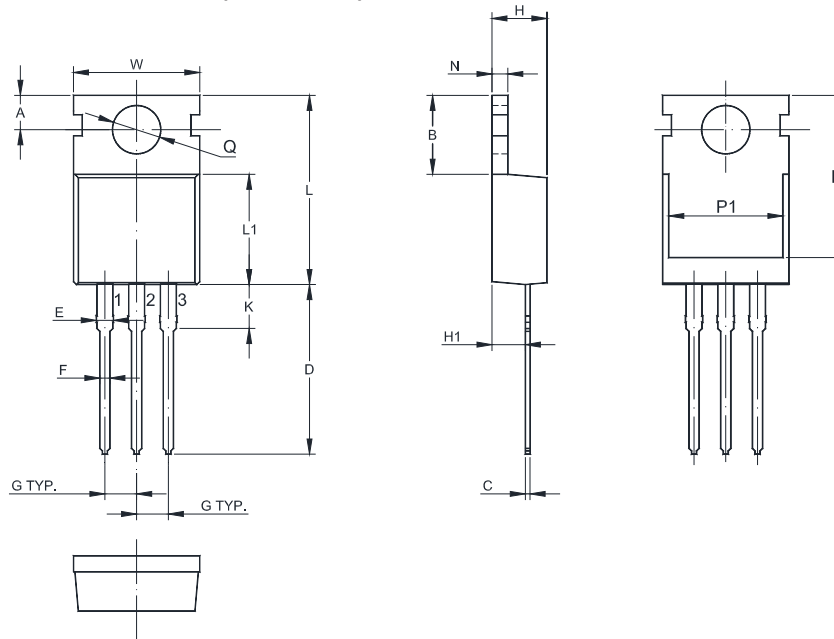
Fig. 14 Normalized Maximum Transient Thermal Impedance($Z_{\theta JA}$)



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

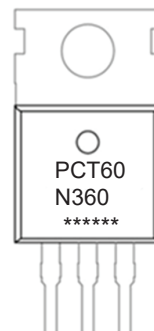
Package	Carton Quantity	Box Quantity	Base Quantity	Delivery Mode
TO-220FB	5 K / Carton	1 K / Box	50 pcs / Tube	Tube

Marking information

" PCT60N360 " = Part No.

" ***** " = Date Code Marking

Font type: Arial



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