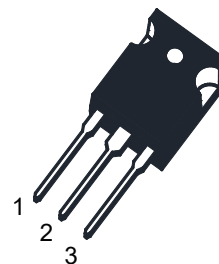
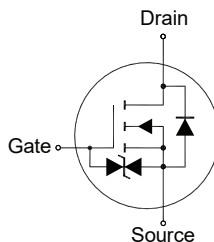


N-Channel Enhancement Mode MOSFET

Features

- AEC-Q101 Qualified
- Built-in G-S Protection Diode
- Halogen and Antimony Free(HAF), RoHS compliant
- Typical ESD Protection HBM Class 2

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



1.Gate 2.Drain 3.Source
TO-247 Plastic Package

Key Parameters

Parameter	Value	Unit
BV_{DSS}	650	V
$R_{DS(ON)}$ Max	65 @ $V_{GS} = 10$ V	mΩ
$V_{GS(th)}$ typ	3.5	V
Q_g typ	101 @ $V_{GS} = 10$ V	nC

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current $T_c = 25^\circ\text{C}$ $T_c = 100^\circ\text{C}$	I_D	38 24	A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	160	A
Avalanche Current	I_{AS}	6.3	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	1567.7	mJ
Total Power Dissipation $T_c = 25^\circ\text{C}$	P_{tot}	192.3	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.6	0.65	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	-	40	$^\circ\text{C/W}$

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

²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 79$ mH, $R_g = 25$ Ω, $I_{AS} = 6.3$ A, $V_{GS} = 10$ 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 $I_D = 1\text{ mA}$	BV_{DSS}	650	-	-	V
Drain-Source Leakage Current at $V_{DS} = 520\text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 24\text{ V}$	I_{GSS}	-	-	± 10	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	$V_{GS(th)}$	2.5	-	4.5	V
Drain-Source On-State Resistance at $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$	$R_{DS(on)}$	-	53	65	$\text{m}\Omega$
DYNAMIC PARAMETERS					
Forward Transconductance at $V_{DS} = 10\text{ V}$, $I_D = 20\text{ A}$	g_{FS}	-	36	-	S
Gate Resistance at $V_{GS} = 0\text{ V}$, $V_{DS} = 0\text{ V}$, $f = 1\text{ MHz}$	R_g	-	5.2	-	Ω
Input Capacitance at $V_{GS} = 0\text{ V}$, $V_{DS} = 350\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	4884	-	pF
Output Capacitance at $V_{GS} = 0\text{ V}$, $V_{DS} = 350\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	103	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0\text{ V}$, $V_{DS} = 350\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	4	-	pF
Gate charge total at $V_{DS} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$	Q_g	-	101	-	nC
Gate to Source Charge at $V_{DS} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$	Q_{gs}	-	28	-	nC
Gate to Drain Charge at $V_{DS} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$	Q_{gd}	-	35	-	nC
Turn-On Delay Time at $V_{DS} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$, $R_G = 4.7\text{ }\Omega$	$t_{d(on)}$	-	74	-	ns
Turn-On Rise Time at $V_{DS} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$, $R_G = 4.7\text{ }\Omega$	t_r	-	48	-	ns
Turn-Off Delay Time at $V_{DS} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$, $R_G = 4.7\text{ }\Omega$	$t_{d(off)}$	-	65	-	ns
Turn-Off Fall Time at $V_{DS} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$, $R_G = 4.7\text{ }\Omega$	t_f	-	13	-	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	-	-	38	A
Body-Diode Continuous Current, Pulsed	I_{SM}	-	-	160	A
Body Diode Reverse Recovery Time at $I_S = 20\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	418	-	ns
Body Diode Reverse Recovery Charge at $I_S = 20\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	8.7	-	μC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

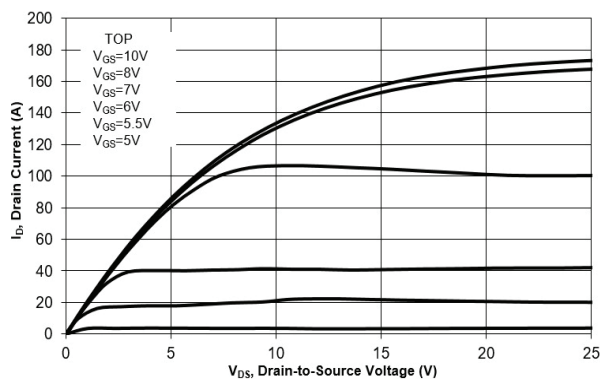


Fig. 2 Typical Transfer Characteristics

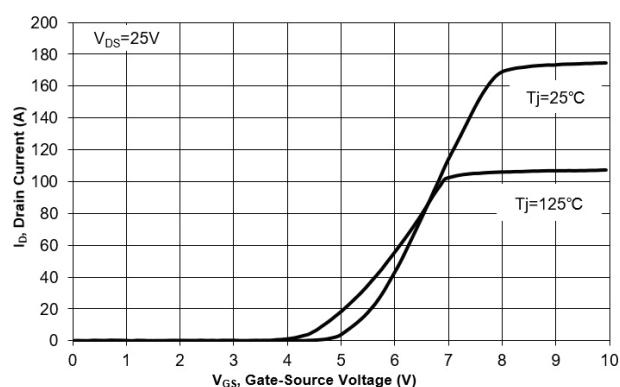


Fig. 3 On-Resistance vs. Drain Current

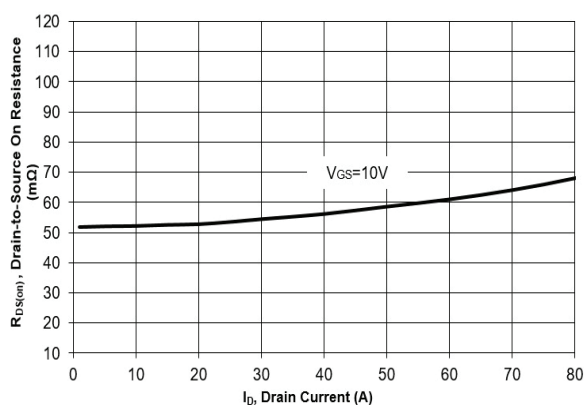


Fig. 4 On-Resistance vs. Gate to Source Voltage

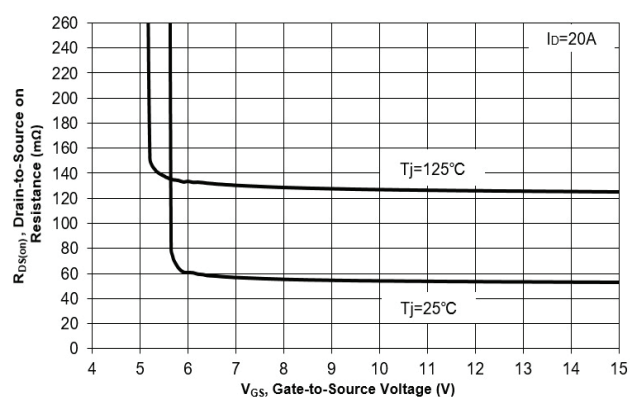


Fig. 5 On-Resistance vs. T_J

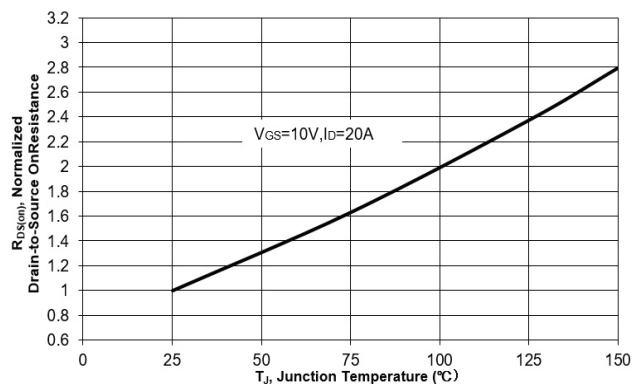
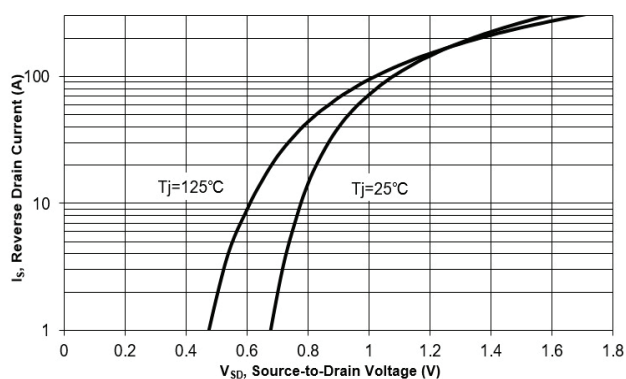


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

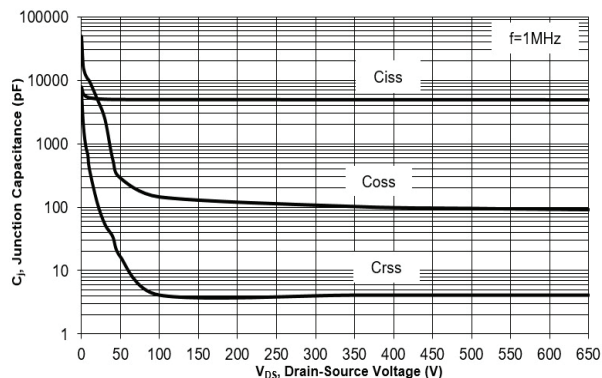


Fig. 8 Drain-Source Leakage Current vs. T_J

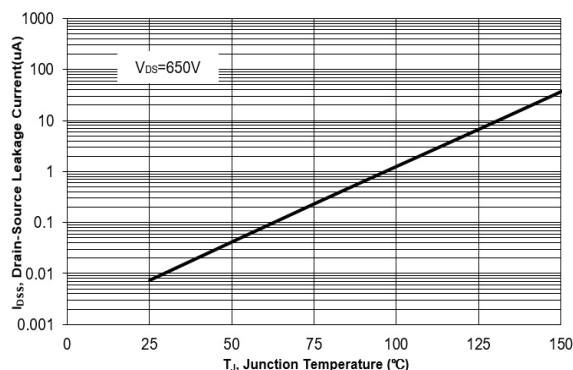


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

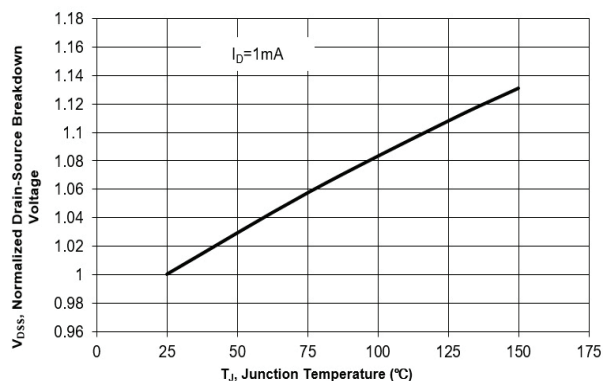


Fig. 10 Gate Threshold Variation vs. T_J

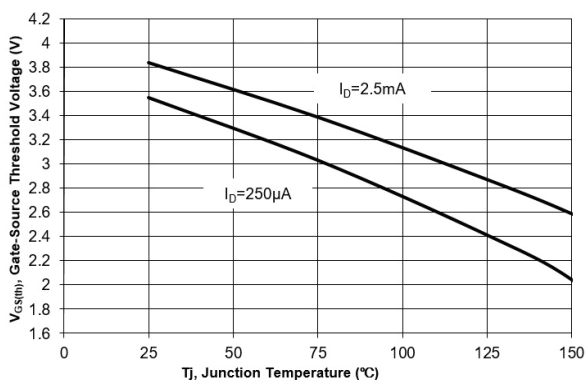


Fig. 11 Gate Charge

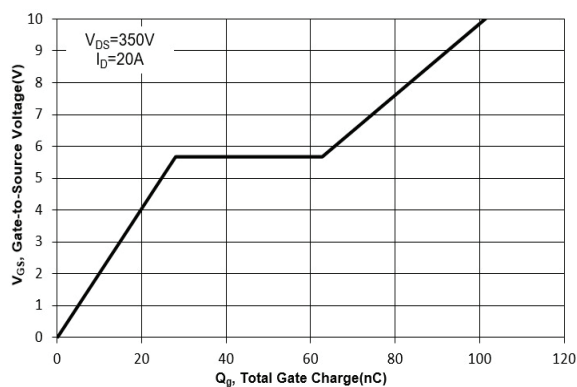


Fig. 12 Safe Operation Area

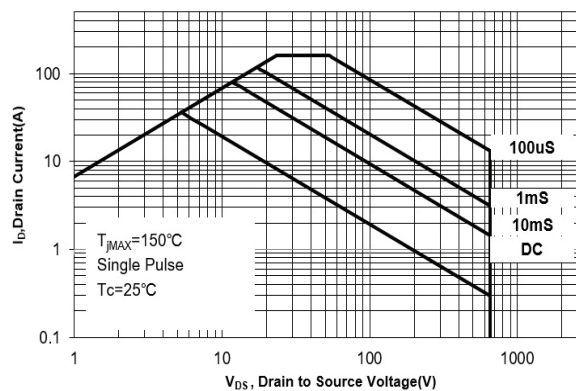


Fig. 13 Normalized Maximum Transient Thermal Impedance($z_{\theta JC}$)

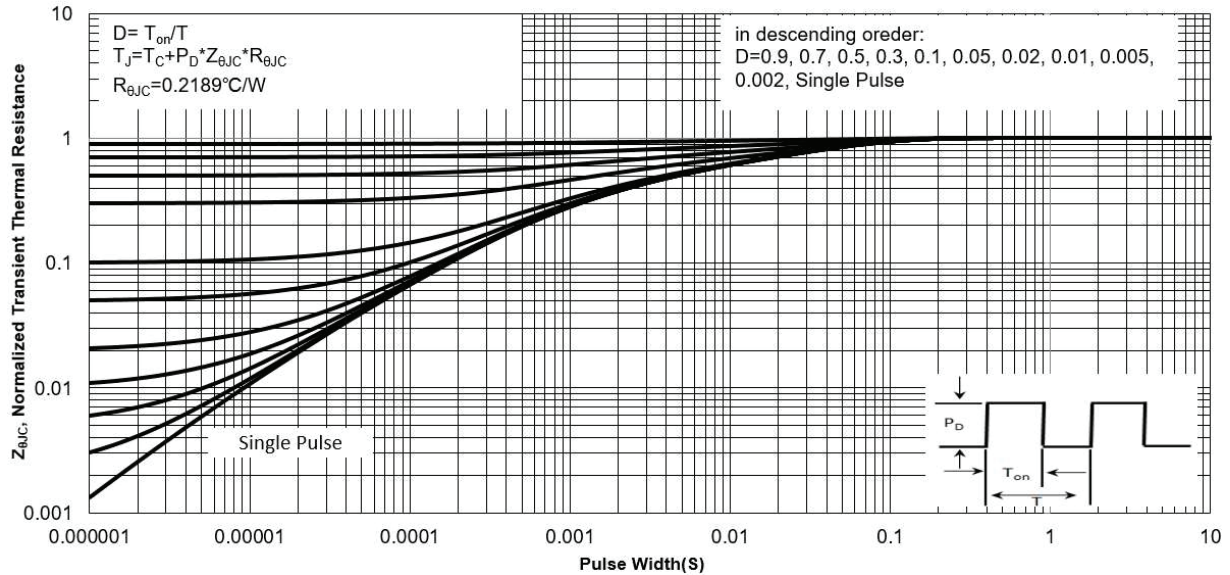
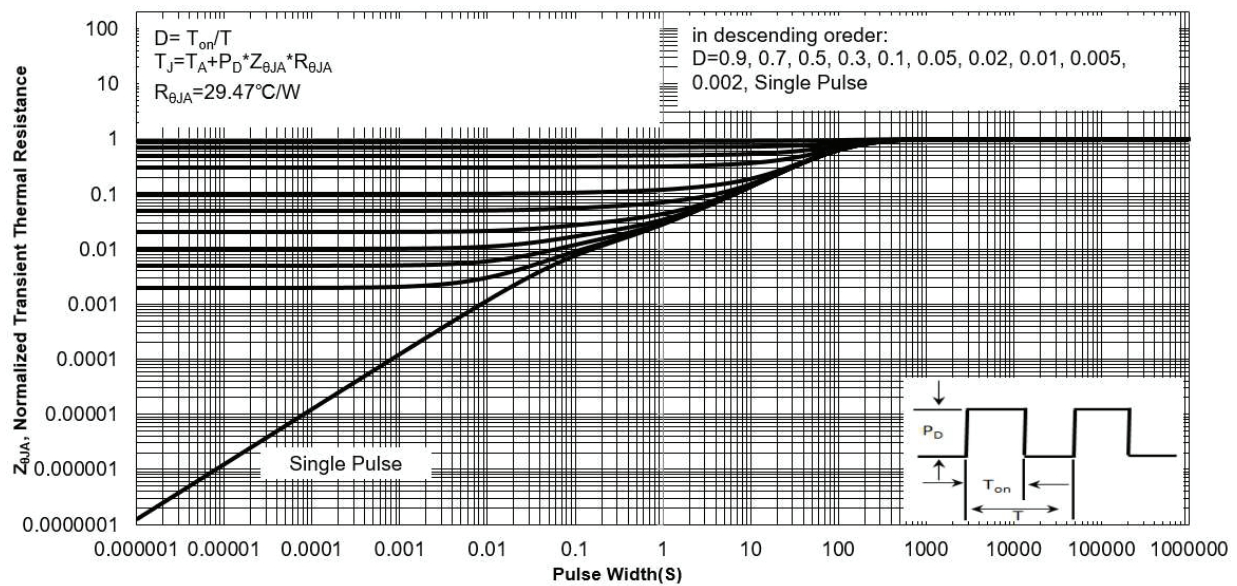


Fig. 14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

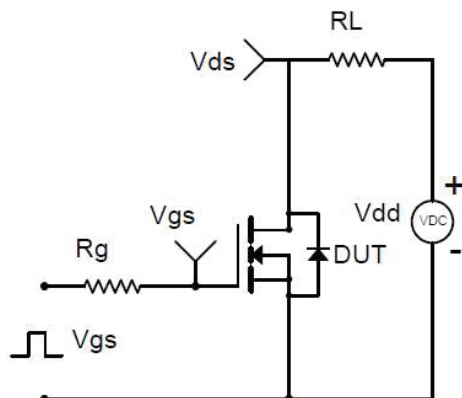


Fig.1-2 Switching Waveform

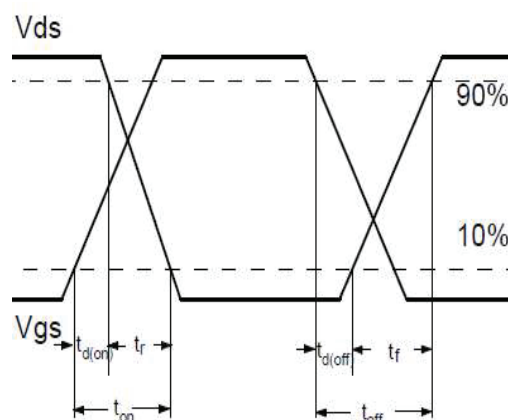


Fig.2-1 Gate charge test circuit

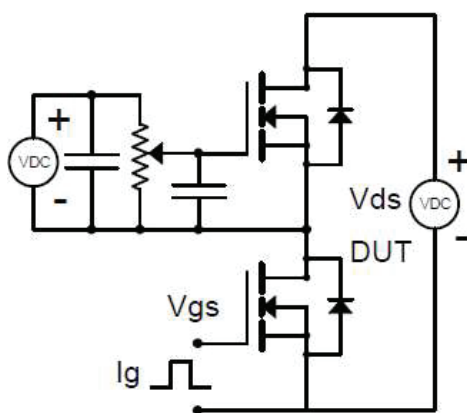


Fig.2-2 Gate charge waveform

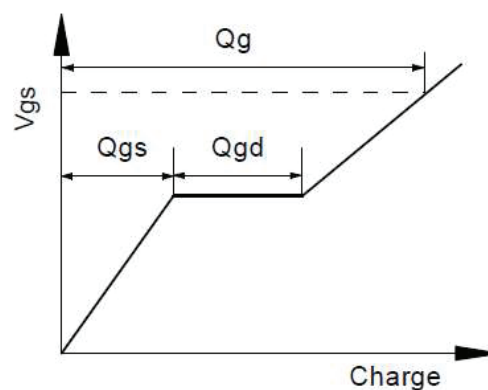


Fig.3-1 Avalanche test circuit

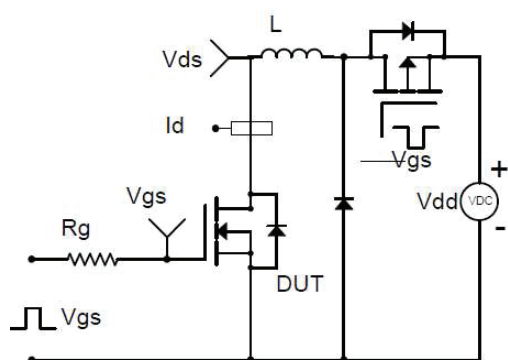
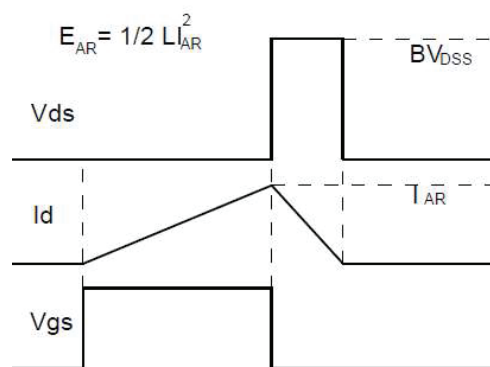
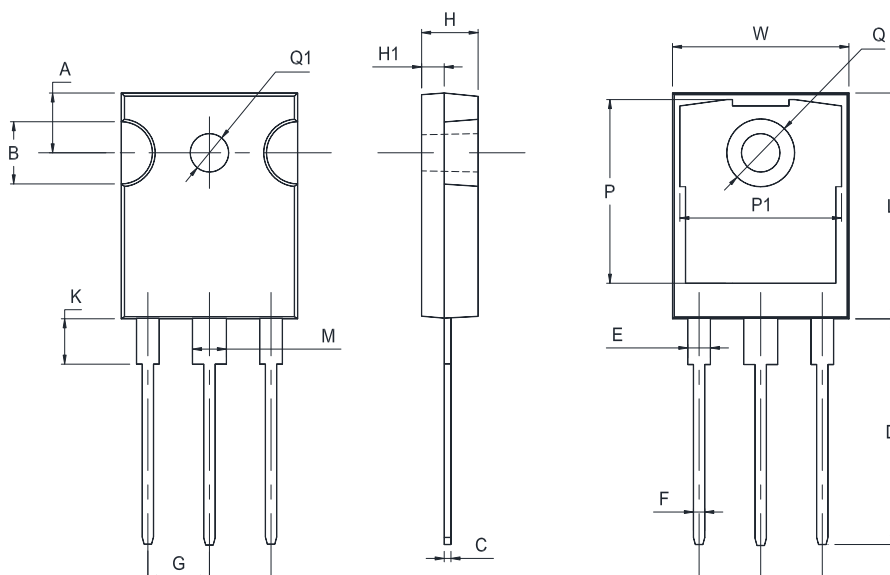


Fig.3-2 Avalanche waveform



Package Outline Dimensions (Units: mm)
TO-247


UNIT	A	B	C	D	E	F	G	W	H	H1	K	L	M	P
mm	6.5	5.2	0.7	20.3	2.2	1.3	5.7	16.2	5.3	2.4	4.45	21.3	3.2	16.6
	5.9	4.6	0.5	19.7	1.8	1.1	5.1	15.8	4.7	1.8	4.05	20.7	2.8	16.2

UNIT	P1	Q	Q1
mm	14.2	7.35	4.2
	13.8	7.05	3.6

Packing information

Package	Carton Quantity	Box Quantity	Base Quantity	Delivery Mode
TO-247	2.88 K / Carton	720 pcs / Box	30 pcs / Tube	Tube

Marking information

" PPT65N065K " = Part No

" ***** " = Date Code Marking

Font type: Arial



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