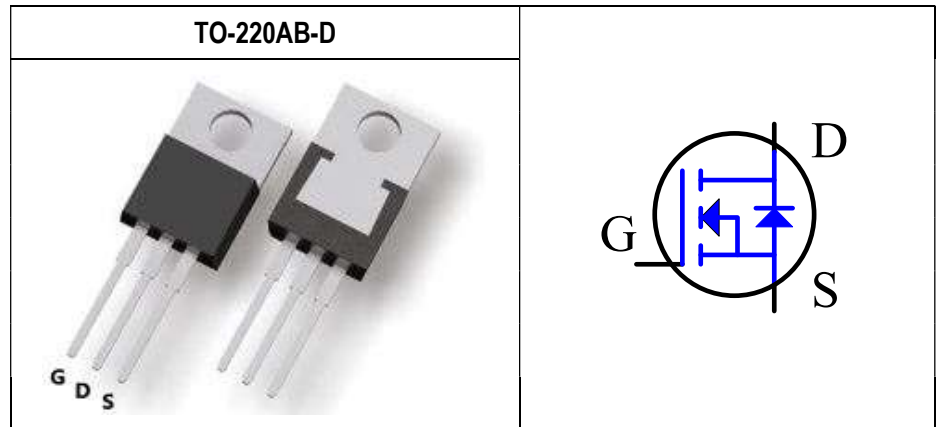


Parameter	Value	Unit
V_{DSS}	100	V
$R_{DS(ON) \text{ max. } V_{GS}=10V}$	3.9	m Ω
I_D	178	A
$V_{GS(TH) \text{ Typ.}}$	3.0	V
$C_{iss \text{ Typ.}}$	6525	pF
$Q_{g10V \text{ Typ.}}$	116.6	nC
E_{AS}	88.2	mJ



Features	Application
- Low On-Resistance $R_{DS(on)}$ - Low Input Capacitance - Low Gate Charge - Fully Characterized Capacitance and Avalanche - Pb-free lead plating; RoHS compliant	- DC to DC converter - LED Lighting Driver - Load Switch Application - Motor Driving Application - Switch Mode Power Supply

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
DG100N02PB	Halogen-Free	TO-220AB-D	PB	Tube	50

Absolute Maximum Ratings ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous ^{Note 1}	$T_C=25^\circ\text{C}$	178	A
	$T_C=100^\circ\text{C}$	113	A
Drain Current-Continuous ^{Note 2}	$T_A=25^\circ\text{C}$	18.7	A
	$T_A=70^\circ\text{C}$	10	A
Drain Current-Pulsed ^{Note 3}	$T_C=25^\circ\text{C}$	400	A
Avalanche Current	I_{AR}	42	A
Single Pulse Avalanche Energy ^{Note 4}	E_{AS}	88.2	mJ
Maximum Power Dissipation	$T_C=25^\circ\text{C}$	219	W
	$T_C=100^\circ\text{C}$	87.7	W
	$T_A=25^\circ\text{C}$	2.4	W
	$T_A=70^\circ\text{C}$	1.5	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-Case ^{Note 5}	$R_{\theta JC}$	Steady State	-	-	0.57	$^\circ\text{C/W}$
Thermal resistance, Junction-Ambient ^{Note 5}	$R_{\theta JA}$	Steady State	-	-	51.82	$^\circ\text{C/W}$

Notes:

- Limited by silicon chip capability and $R_{\theta JC}$ junction-to-case thermal resistance.
- The maximum current rating is limited by package and $R_{\theta JA}$ junction-to-ambient thermal resistance.
- Must be ensure junction temperature does not exceed 150-degree C. (Pulse Width $\leq 100\mu\text{s}$, Duty $\leq 2\%$)
- Limited by T_{Jmax} , starting $T_J=25^\circ\text{C}$, $L=0.1\text{mH}$, $R_G=25\Omega$, $I_D=42\text{A}$, $V_{GS}=10\text{V}$.
- The value of thermal resistance is measured with the single device put on cooling plate under a still air environment temperature is 25 degree C based on JEDEC standard JESD51-14 and JESD51-2a. Thermal resistance obtained depends on the user's specific board design and given application.

Electrical Characteristics (T_J=25°C unless otherwise noted)

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _{DS} =250μA	100	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
		V _{DS} =100V, V _{GS} =0V, T _J =125°C	-	-	100	μA
Gate-Body Leakage	I _{GSS}	V _{GS} =+20V/-14V, V _{DS} =0V	-	-	±100	nA

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250μA	2.8	3.0	3.3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _{DS} =50A	-	3.6	3.9	mΩ
Gate Resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	0.8	-	Ω
Forward Transconductance	g _{fs}	V _{DS} =5V, I _{DS} =20A	-	40	-	S

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C _{iss}	V _{DD} =100V, V _{DS} =50V, V _{GS} =0V, f=1MHz	-	6525	-	pF
Output Capacitance	C _{oss}	V _{DD} =100V, V _{DS} =50V, V _{GS} =0V, f=1MHz	-	725.5	-	pF
Reverse Transfer Capacitance	C _{rss}	V _{DD} =100V, V _{DS} =50V, V _{GS} =0V, f=1MHz	-	31.5	-	pF
Turn-On Delay Time	T _{d(on)}	V _{DS} =50V, V _{GS} =10V, I _{DS} =50A, R _{GEN} =2.4Ω	-	22.8	-	nS
Rise Time	T _r	V _{DS} =50V, V _{GS} =10V, I _{DS} =50A, R _{GEN} =2.4Ω	-	90.3	-	nS
Turn-Off Delay Time	T _{d(off)}	V _{DS} =50V, V _{GS} =10V, I _{DS} =50A, R _{GEN} =2.4Ω	-	55.3	-	nS
Fall Time	T _f	V _{DS} =50V, V _{GS} =10V, I _{DS} =50A, R _{GEN} =2.4Ω	-	92.7	-	nS

GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q _{gs}	V _{DD} =50V, I _D =50A, V _{GS} =0 to 10V	-	33.6	-	nC
Gate charge at threshold	Q _{g(th)}	V _{DD} =50V, I _D =50A, V _{GS} =0 to 10V	-	20.4	-	nC
Gate to Drain Charge	Q _{gd}	V _{DD} =50V, I _D =50A, V _{GS} =0 to 10V	-	40	-	nC
Switching charge	Q _{sw}	V _{DD} =50V, I _D =50A, V _{GS} =0 to 10V	-	53.3	-	nC
Gate charge total	Q _{g 10V}	V _{DD} =50V, I _D =50A, V _{GS} =0 to 10V	-	116.6	-	nC
Gate plateau voltage	V _{plateau}	V _{DD} =50V, I _D =50A, V _{GS} =0 to 10V	-	5.2	-	V
Gate charge total, sync. FET (Q _g - Q _{gd})	Q _{g(sync)}	V _{DS} =0.1V, V _{GS} =0 to 10V	-	76.6	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Body Diode continuous forward current	I _S	T _C =25°C	-	178	-	A
Body Diode pulse current	I _{SM}	T _C =25°C	-	-	200	A
Body Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =50A	-	0.89	1.0	V
Body Diode Reverse Recovery Time	t _{rr}	V _{DD} =50V, I _F =50A, di/dt=100A/μs	-	65.9	-	nS
		V _{DD} =50V, I _F =50A, di/dt=200A/μs	-	59.5	-	nS
Body Diode Reverse Recovery Charge	Q _{rr}	V _{DD} =50V, I _F =50A, di/dt=100A/μs	-	71.6	-	nC
		V _{DD} =50V, I _F =50A, di/dt=200A/μs	-	122.1	-	nC
Body Diode Reverse Recovery Current	I _{rm}	V _{DD} =50V, I _F =50A, di/dt=100A/μs	-	2.1	-	A
		V _{DD} =50V, I _F =50A, di/dt=200A/μs	-	3.8	-	A

Typical Operating Characteristics

Fig. 1: Output Characteristics

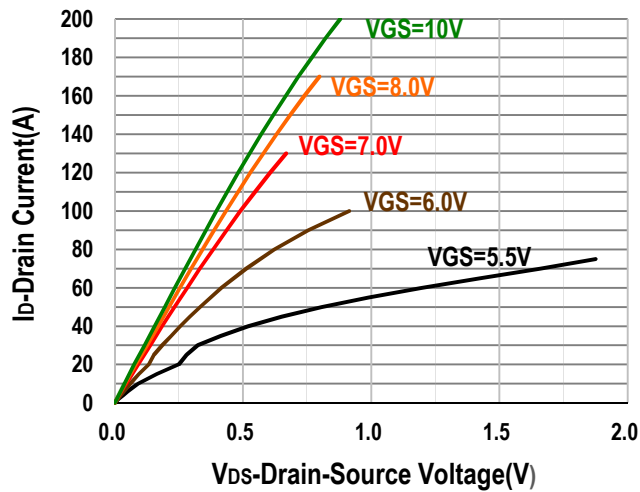


Fig. 2: Normalized $V_{(TH)GS}$ Voltage Vs. T_A

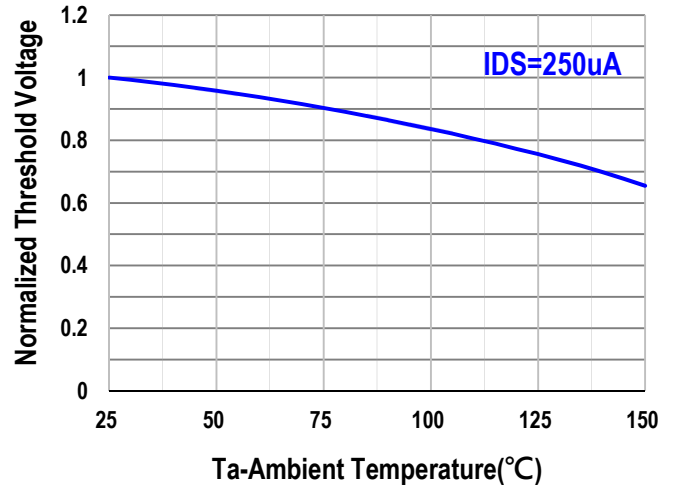


Fig. 3: Drain-Source On Resistance Vs V_{GS}

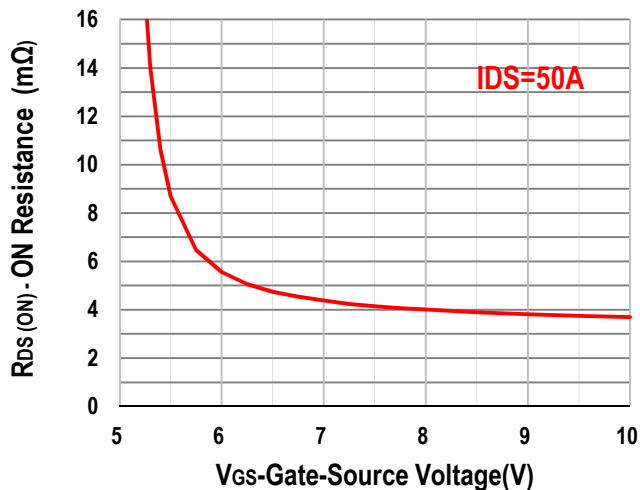


Fig. 4: Normalized $R_{DS(ON)}$ Resistance Vs. T_A

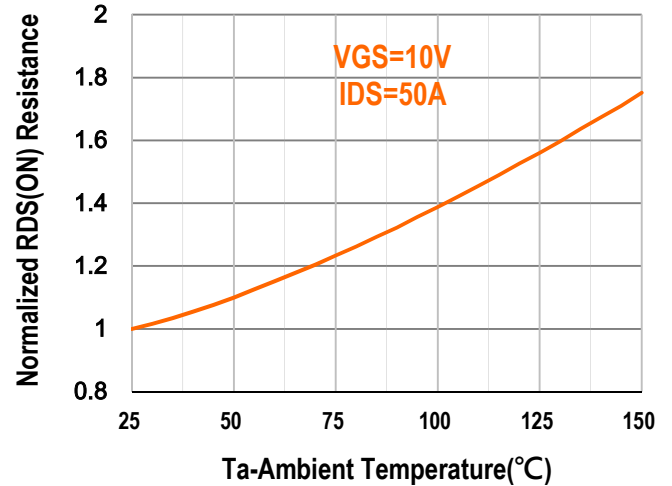


Fig. 5: Drain-Source On Resistance Vs I_D

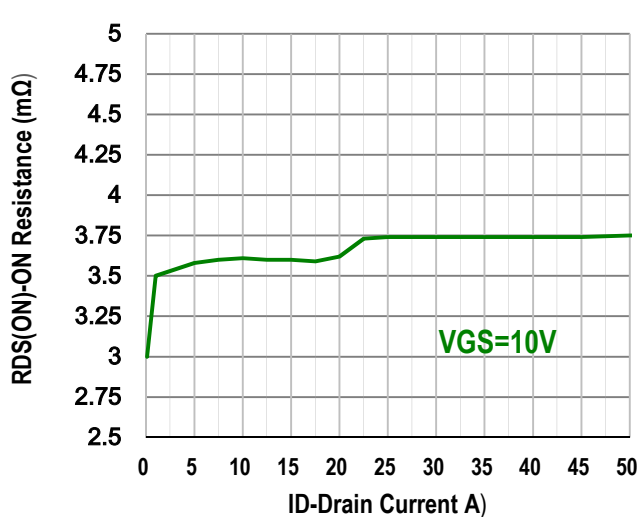
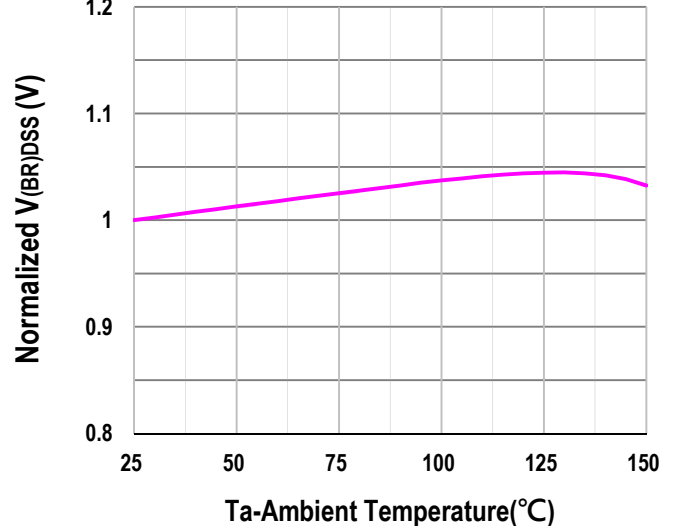


Fig. 6: Normalized BV_{DSS} Voltage Vs T_A



Typical Operating Characteristics

Fig. 7: Typical Capacitance Variation Vs V_{DS}

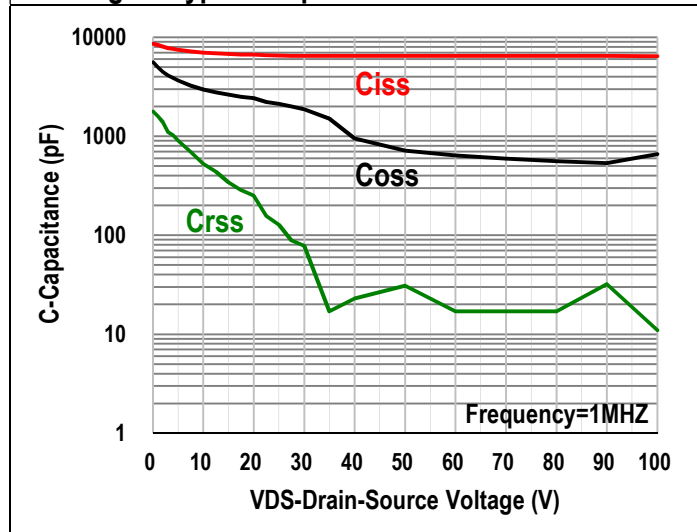


Fig. 8: Gate Charge Vs V_{GS}

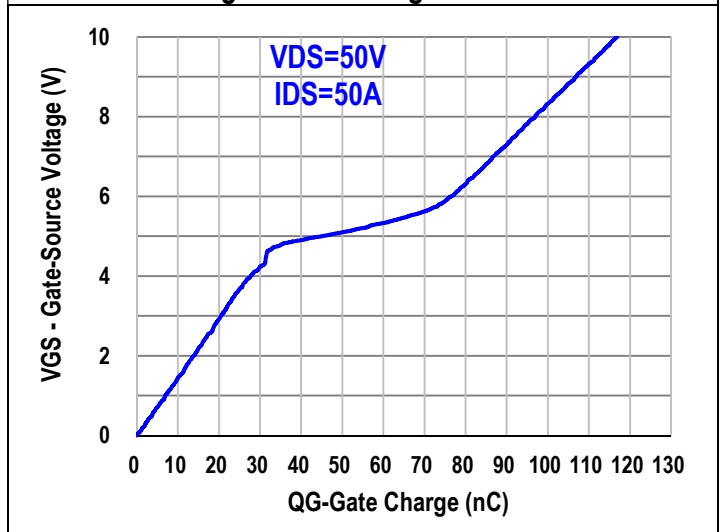


Fig. 9: Power Dissipation Vs. T_c

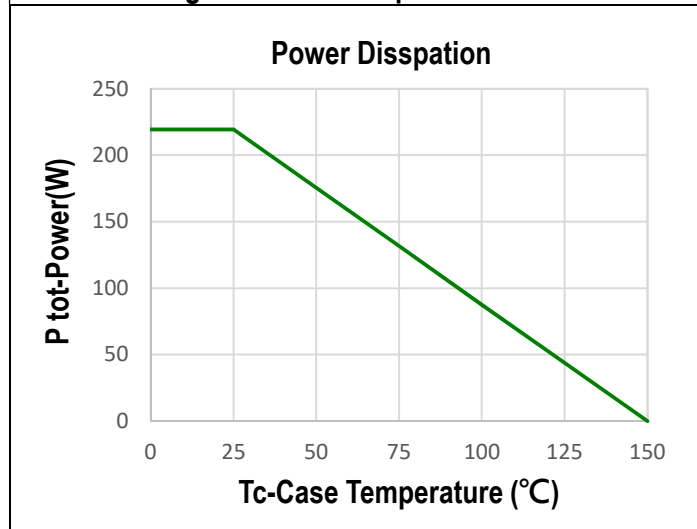


Fig. 10: Drain Current Vs. T_c

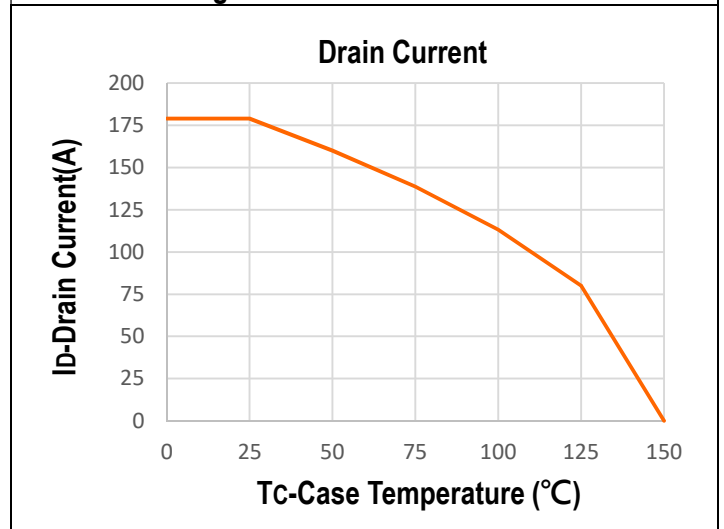


Fig. 11: Body Diode Forward Voltage Vs. I_s

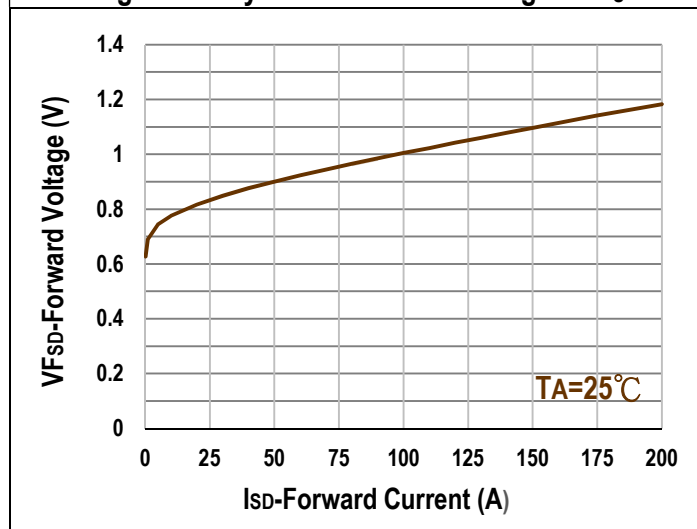
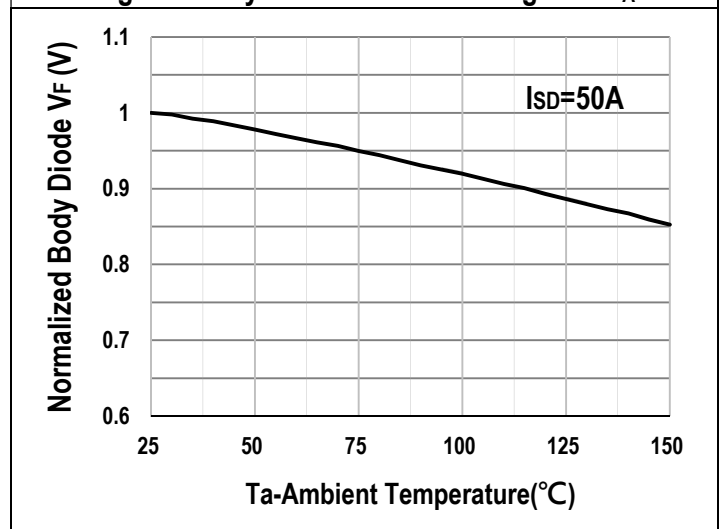


Fig. 12: Body Diode Forward Voltage Vs. T_A



4. Typical Operating Characteristics

Fig. 13: Safe Operation Area

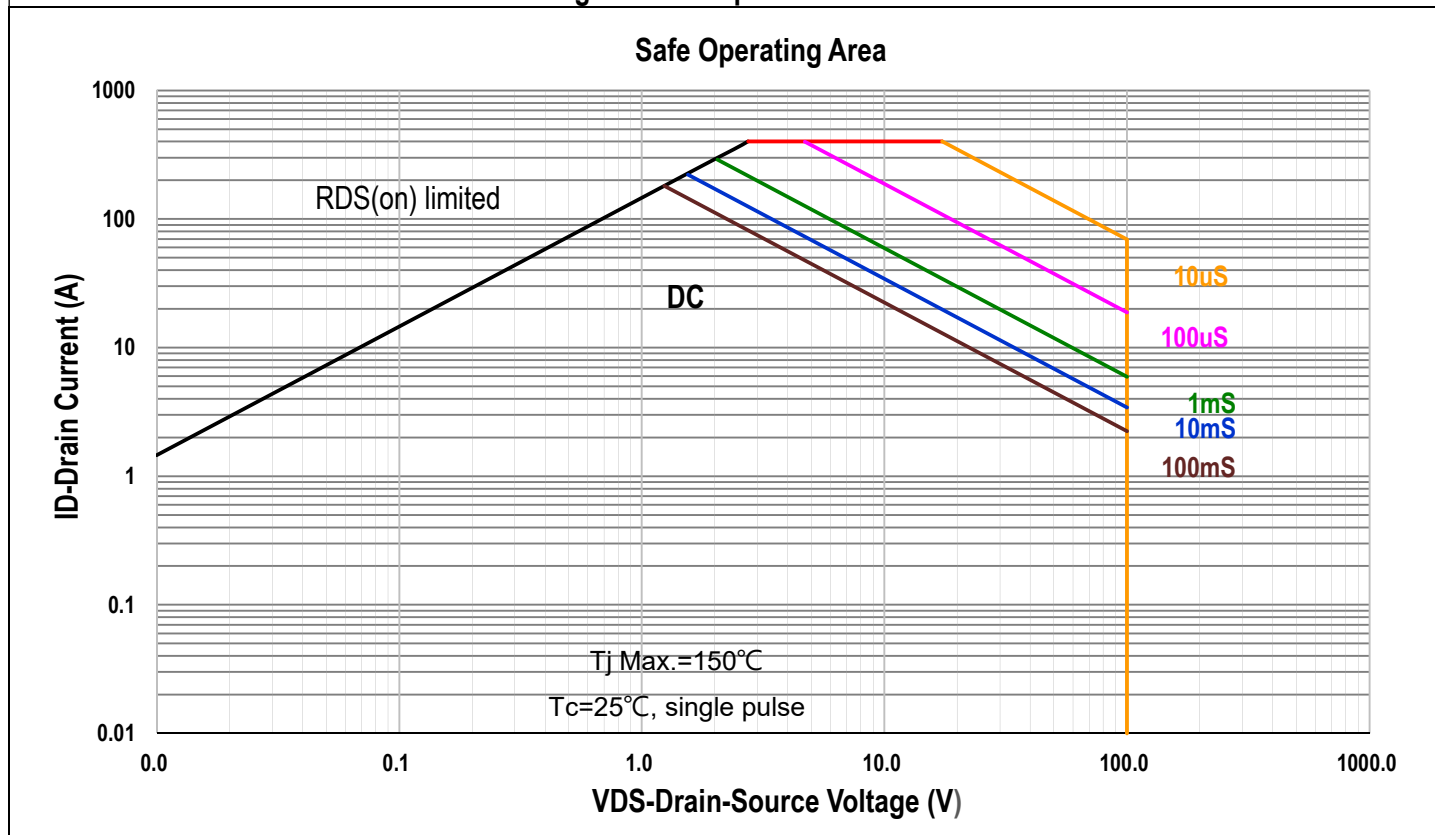
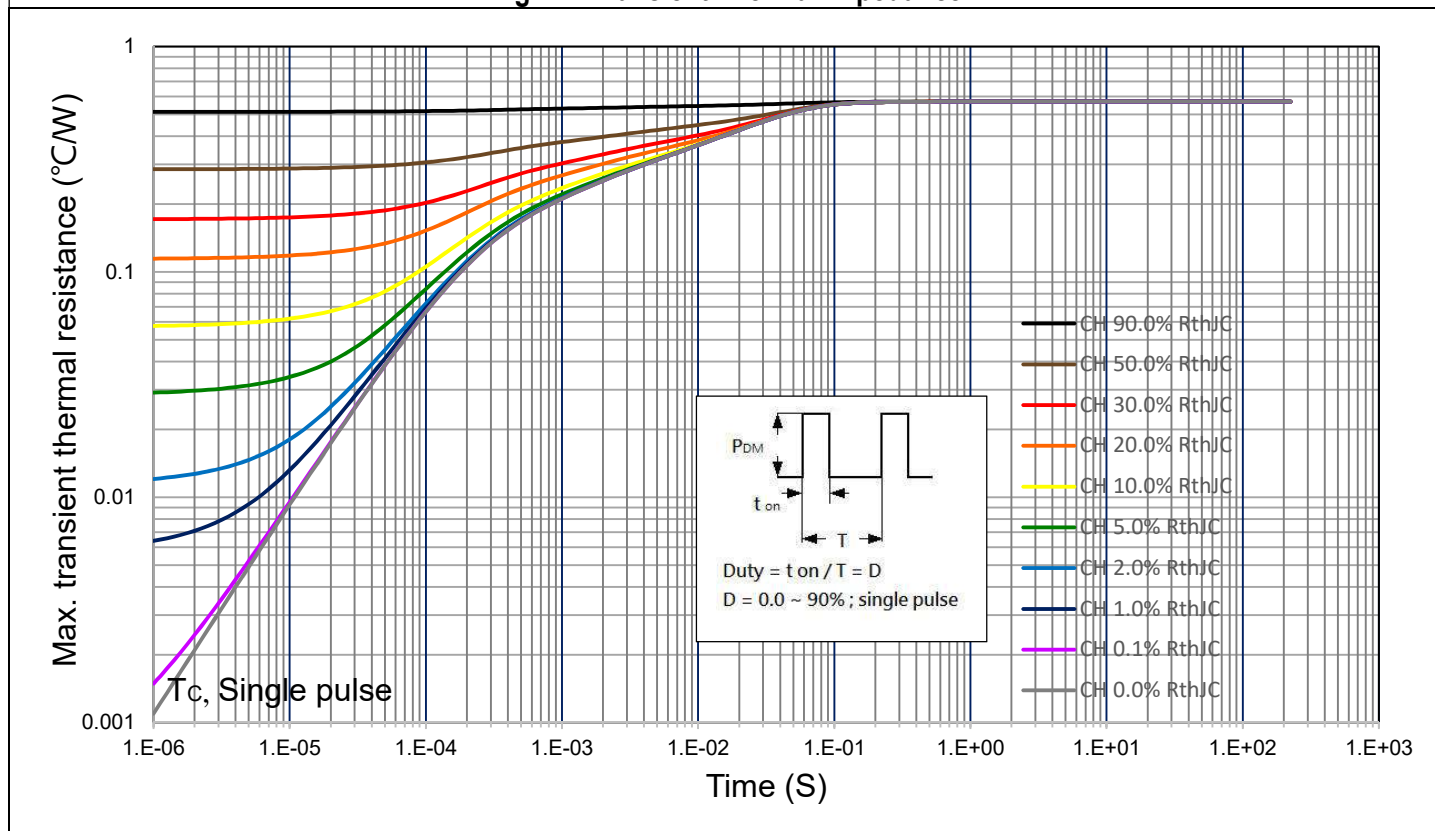
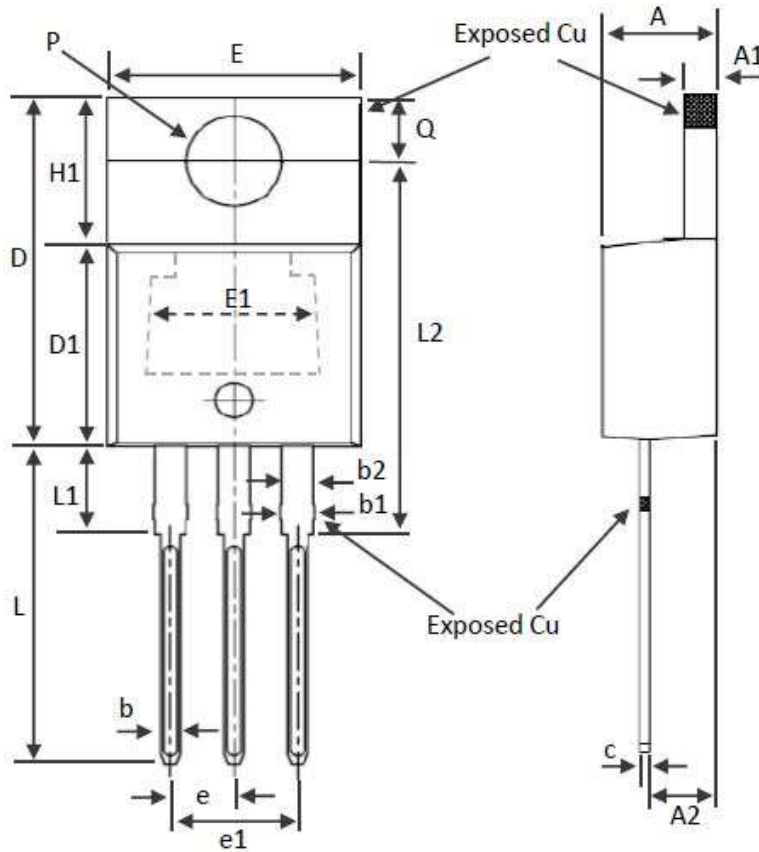


Fig. 14: Transient Thermal Impedance



Package of Dimension



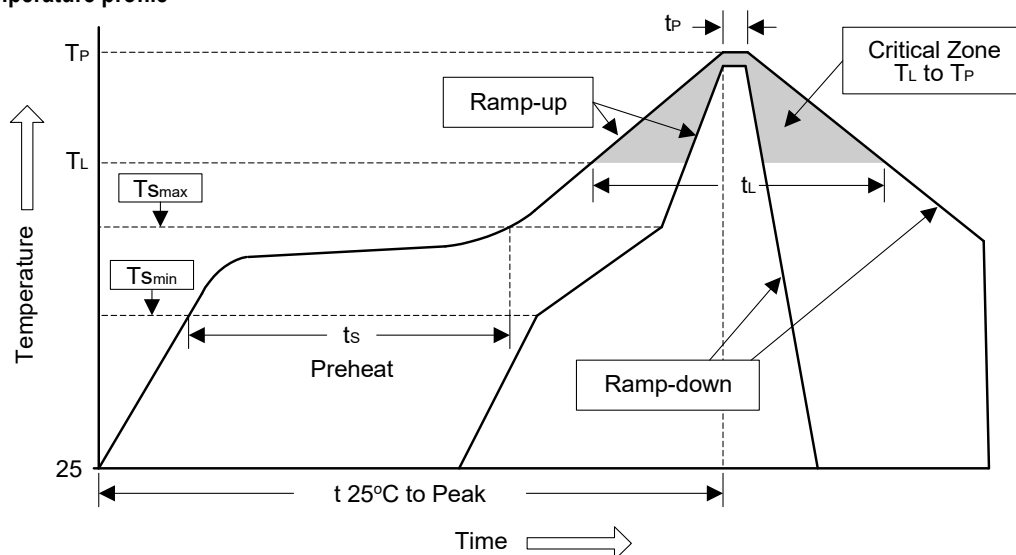
Symbol	Min	Nor	Max
A	3.56	4.57	4.82
A1	0.51	1.27	1.39
A2	2.04	2.67	2.92
b	0.39	0.81	1.01
b1	1.15	1.37	1.82
b2	1.15	1.27	1.77
D	14.22	15.00	16.51
D1	8.39	8.70	9.01
D2	11.45	11.94	12.87
E	9.66	10.11	10.66
E1	6.86	7.00	8.89
e		2.54 Ref.	
e1		5.08 Ref.	
H1	5.85	6.30	6.85
L	12.70	13.60	14.73
L1	-	3.75	6.35
L2	15.80	16.00	16.20
P	3.54	3.87	4.08
Q	2.54	2.74	3.42

Appendix-A

Soldering Methods for Silicongear's Products (Just for SMD type of device)

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (TL to TP)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T _{min})	100°C	150°C
- Temperature Max (T _{max})	150°C	200°C
- Time (min to max) (ts)	60 to 120 sec	60 to 180 sec
T _{max} to TL		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (TL)	183°C	217°C
- Time (t _L)	60 to 150 sec	60 to 150 sec
Peak Temperature (TP)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (tp)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

Appendix-B**Important Notice****© Silicongear Corporation**

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