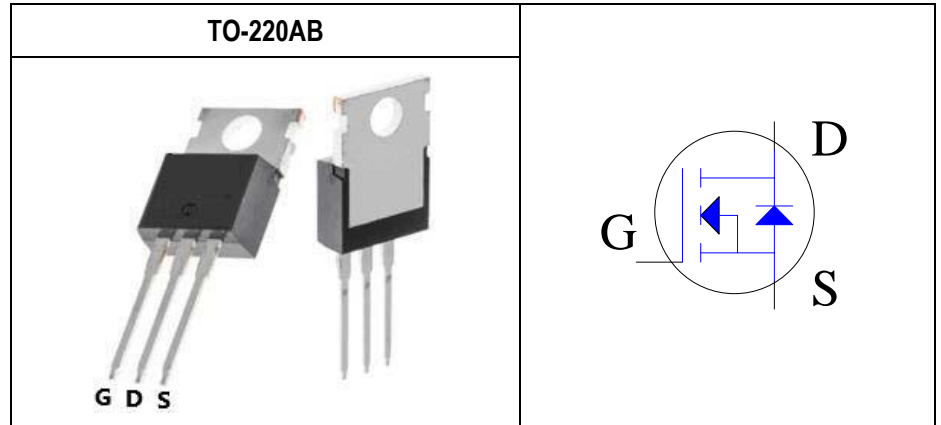


Parameter	Value	Unit
$V_{DSS}$	100	V
$R_{DS(ON) max. V_{GS}=10V}$	8.7	m $\Omega$
$I_D$	107	A
$V_{GS(TH) Typ.}$	1.6	V
$C_{iss} Typ.$	2436	pF
$Q_{g10V} Typ.$	49.1	nC
$E_{AS}$	17.2	mJ



Features	Application
<ul style="list-style-type: none"> <li>• Low On-Resistance <math>R_{DS(on)}</math></li> <li>• Low Input Capacitance</li> <li>• Low Gate Charge</li> <li>• Fully Characterized Capacitance and Avalanche</li> <li>• Pb-free lead plating; RoHS compliant</li> </ul>	<ul style="list-style-type: none"> <li>• Quick Charger</li> <li>• DC to DC Converter</li> <li>• Switch Mode Power Supply</li> <li>• With Logic Level Driving Application</li> <li>• Synchronous Rectifier for Power Delivery</li> </ul>

## Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
DG100N03P	Halogen-Free	TO-220AB	P	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	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous <sup>Note 1</sup>	$I_D$	$T_C=25^\circ\text{C}$	107
		$T_C=100^\circ\text{C}$	67
Drain Current-Continuous <sup>Note 2</sup>	$I_D$	$T_A=25^\circ\text{C}$	14.8
		$T_A=70^\circ\text{C}$	11.8
Drain Current-Pulsed <sup>Note 3</sup>	$I_{DM}$	140	A
Avalanche Current	$I_{AR}$	18.6	A
Single Pulse Avalanche Energy <sup>Note 4</sup>	$E_{AS}$	17.2	mJ
Maximum Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	186
		$T_C=100^\circ\text{C}$	74
		$T_A=25^\circ\text{C}$	3.5
		$T_A=70^\circ\text{C}$	2.3
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 <sup>Note 5</sup>	$R_{\theta JC}$	Steady State	-	-	0.67	$^\circ\text{C/W}$
Thermal resistance, Junction-Ambient <sup>Note 5</sup>	$R_{\theta JA}$	Steady State	-	-	34.73	$^\circ\text{C/W}$

### Notes:

1. Limited by silicon chip capability and  $R_{\theta JC}$  junction-to-case thermal resistance.
2. The maximum current rating is limited by package and  $R_{\theta JA}$  junction-to-ambient thermal resistance.
3. Must be ensure junction temperature does not exceed 150-degree C. (Pulse Width  $\leq 100\mu\text{s}$ , Duty  $\leq 2\%$ )
4. Limited by  $T_{Jmax}$ , starting  $T_J=25^\circ\text{C}$ ,  $L=0.1\text{mH}$ ,  $R_g=25\Omega$ ,  $I_D=18.6\text{A}$ ,  $V_{GS}=10\text{V}$ .
5. 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<sub>J</sub>=25°C unless otherwise noted)

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =-250μA	100	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =80V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	-	-	10	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA

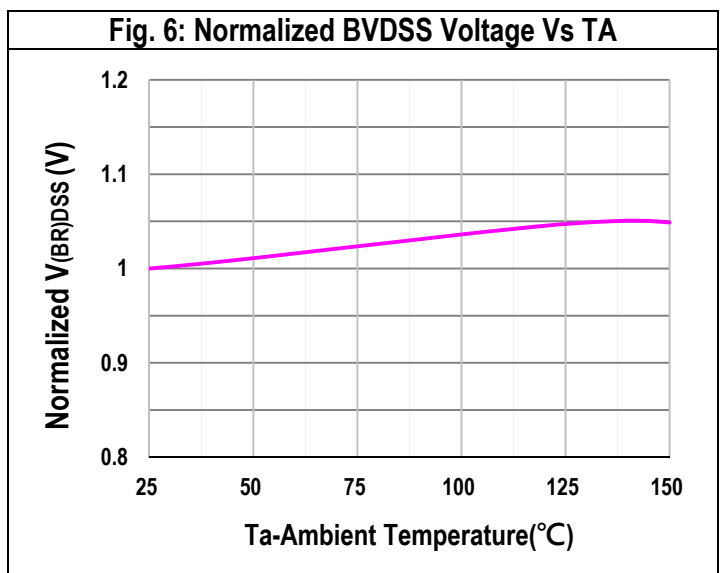
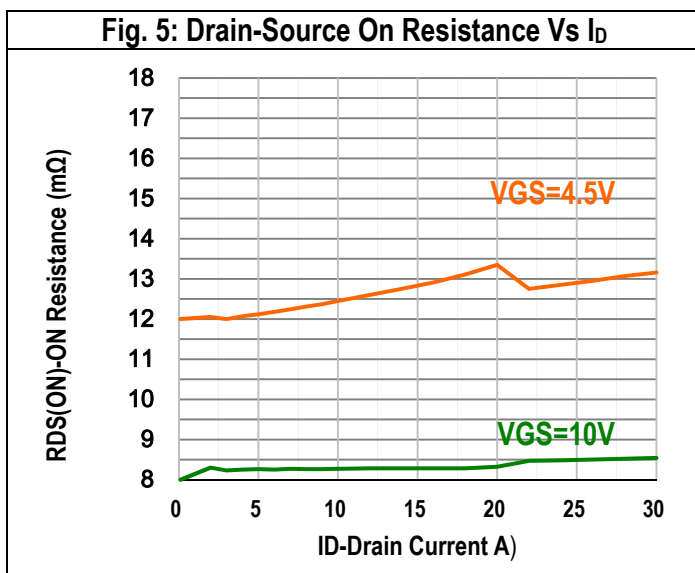
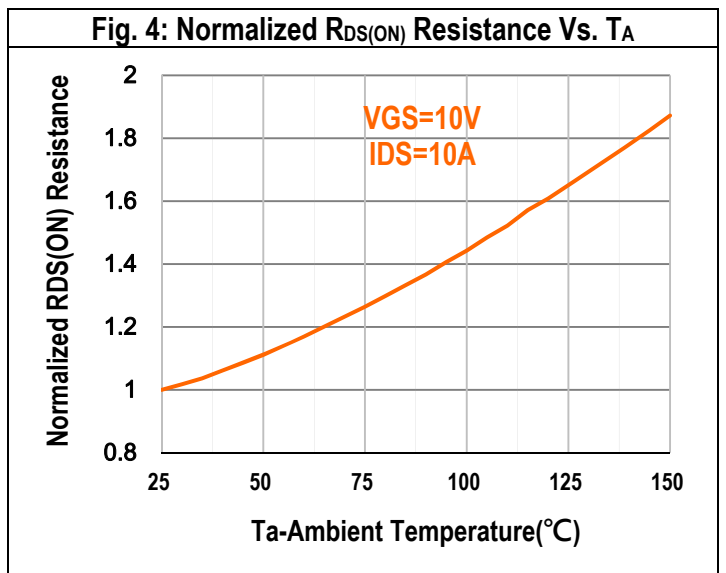
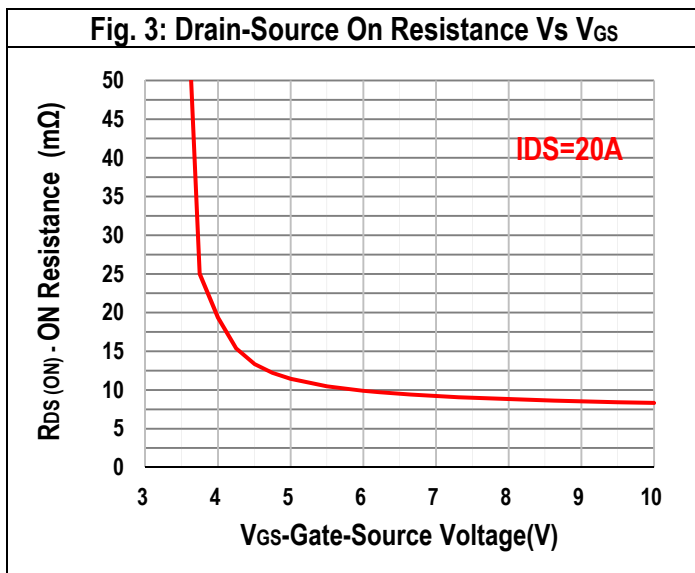
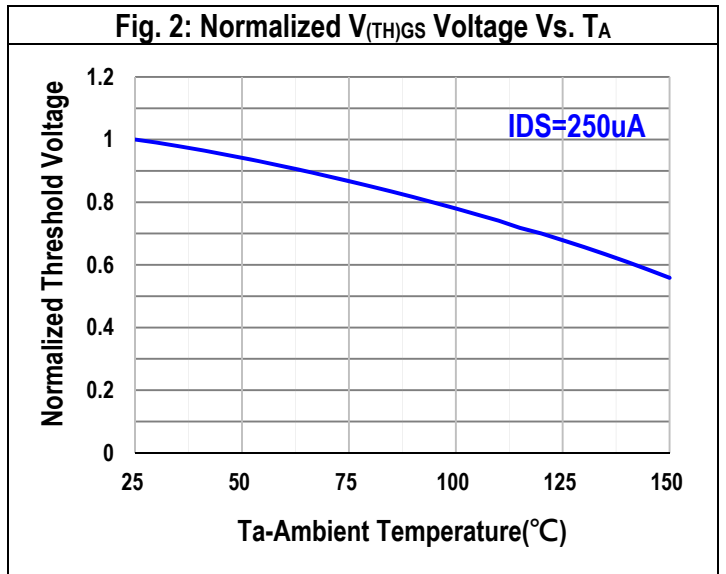
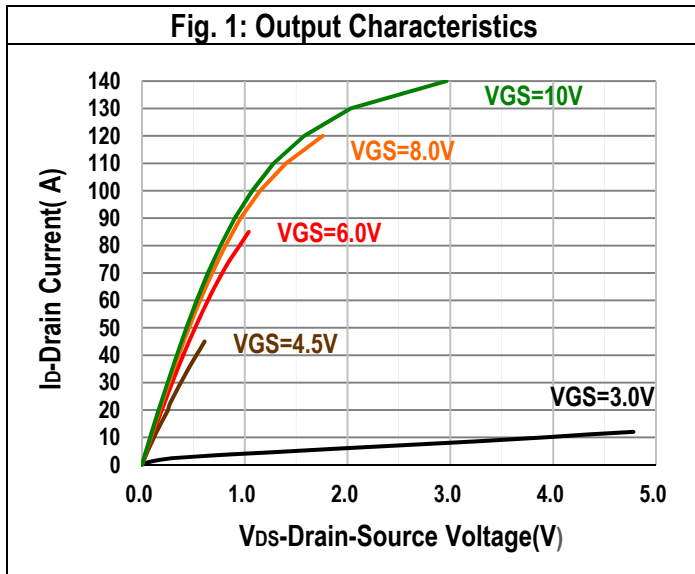
STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1.3	1.6	1.9	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>DS</sub> =20A	-	8	8.7	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =10A	-	12.8	15.1	mΩ
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	-	0.66	-	Ω
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>DS</sub> =20A	-	27	-	S

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C <sub>iss</sub>	V <sub>DD</sub> =100V, V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	2436	-	pF
Output Capacitance	C <sub>oss</sub>	V <sub>DD</sub> =100V, V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	272	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DD</sub> =100V, V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	10.5	-	pF
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A, R <sub>GEN</sub> =3.0Ω	-	10.6	-	nS
Rise Time	T <sub>r</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A, R <sub>GEN</sub> =3.0Ω	-	33.8	-	nS
Turn-Off Delay Time	T <sub>d(off)</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A, R <sub>GEN</sub> =3.0Ω	-	33.6	-	nS
Fall Time	T <sub>f</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A, R <sub>GEN</sub> =3.0Ω	-	63.8	-	nS

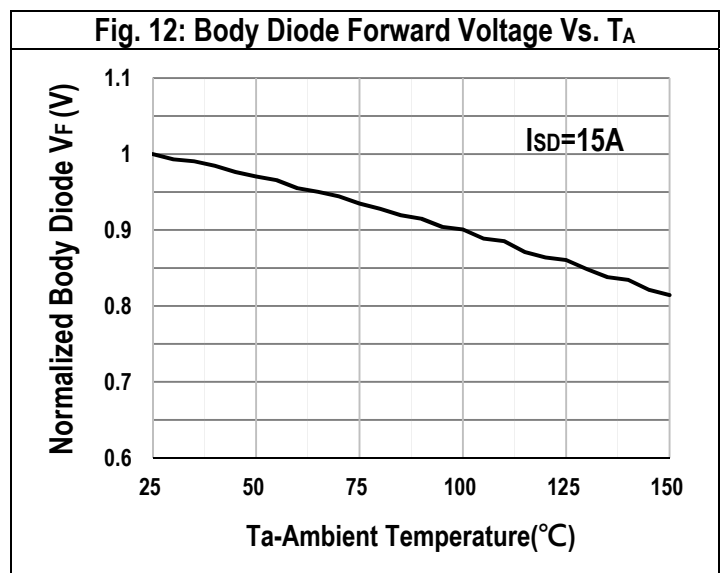
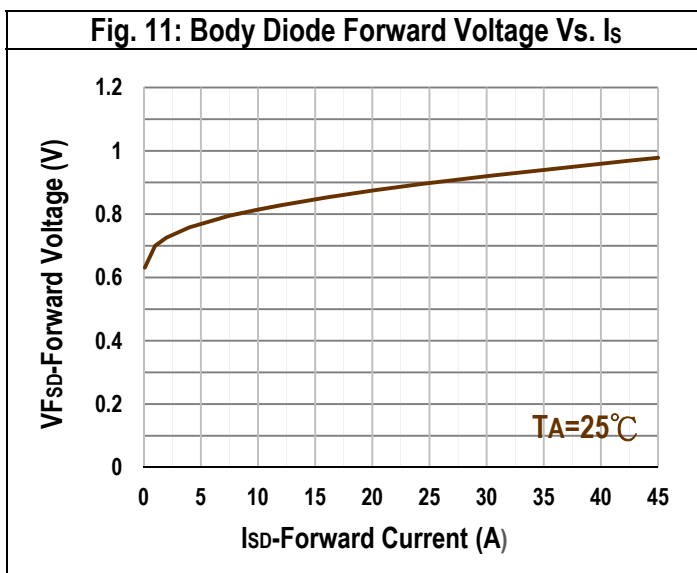
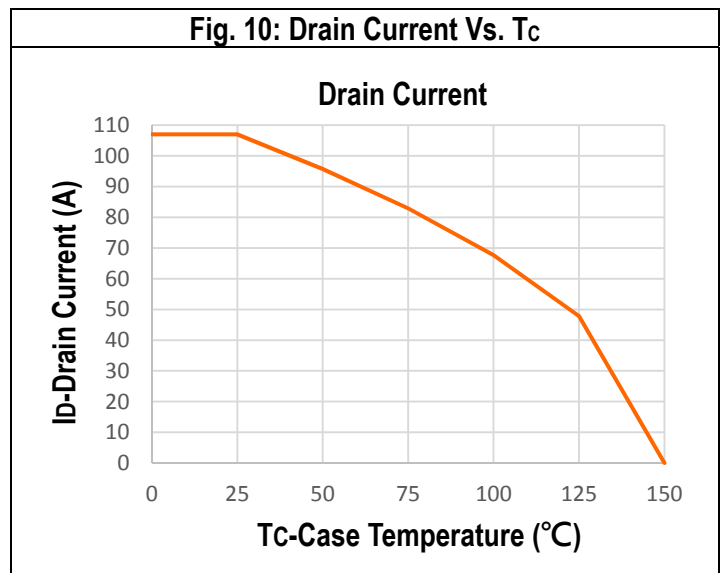
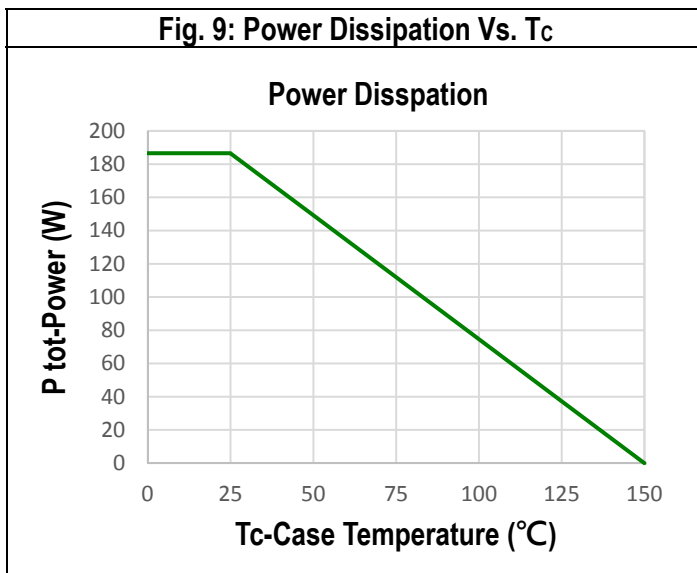
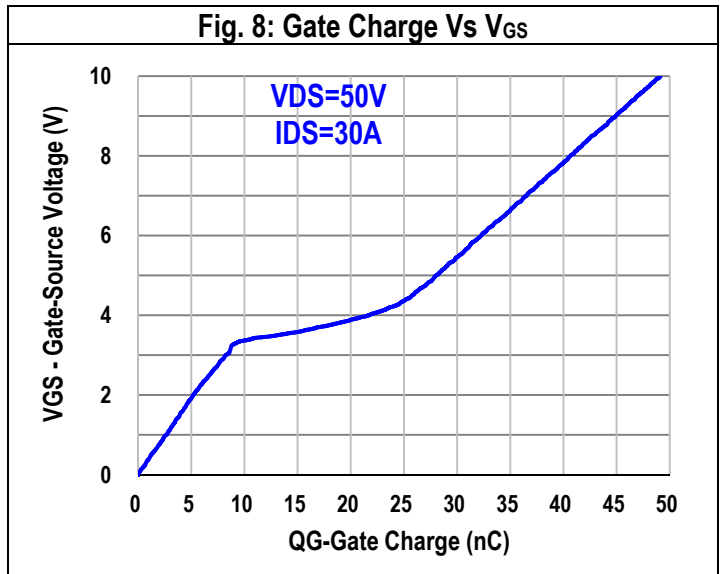
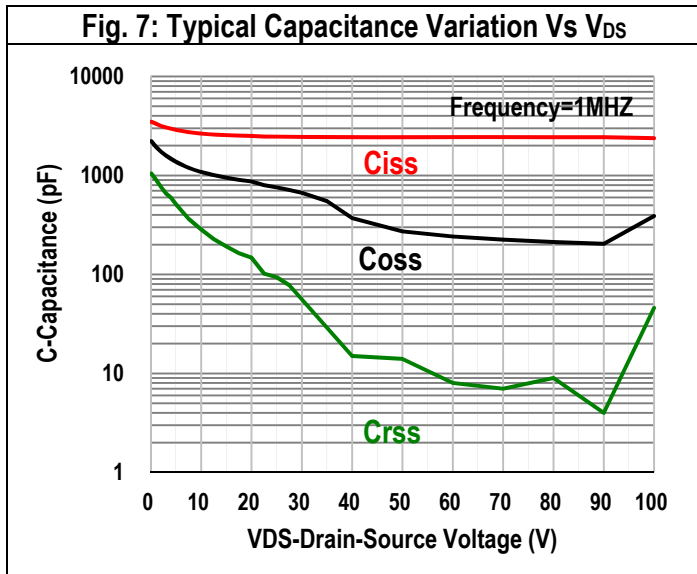
GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q <sub>gs</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A, V <sub>GS</sub> =0 to 10V	-	9.1	-	nC
Gate charge at threshold	Q <sub>g(th)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A, V <sub>GS</sub> =0 to 10V	-	4.5	-	nC
Gate to Drain Charge	Q <sub>gd</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A, V <sub>GS</sub> =0 to 10V	-	15.1	-	nC
Switching charge	Q <sub>sw</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A, V <sub>GS</sub> =0 to 10V	-	19.7	-	nC
Gate charge total	Q <sub>g 10V</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A, V <sub>GS</sub> =0 to 10V	-	49.1	-	nC
Gate plateau voltage	V <sub>plateau</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A, V <sub>GS</sub> =0 to 10V	-	3.6	-	V
Gate charge total, sync. FET (Q <sub>g</sub> - Q <sub>gd</sub> )	Q <sub>g(sync)</sub>	V <sub>DS</sub> =0.1V, V <sub>GS</sub> =0 to 10V	-	34	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Body Diode continuous forward current	I <sub>s</sub>	T <sub>C</sub> =25°C	-	-	45	A
Body Diode pulse current	I <sub>SM</sub>	T <sub>C</sub> =25°C	-	-	140	A
Body Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>s</sub> =20A	-	0.86	1.0	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	32.5	-	nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	61	-	nC
Body Diode Reverse Recovery Current	I <sub>rm</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	3.4	-	A

## Typical Operating Characteristics



Typical Operating Characteristics



4. Typical Operating Characteristics

Fig. 13: Safe Operation Area

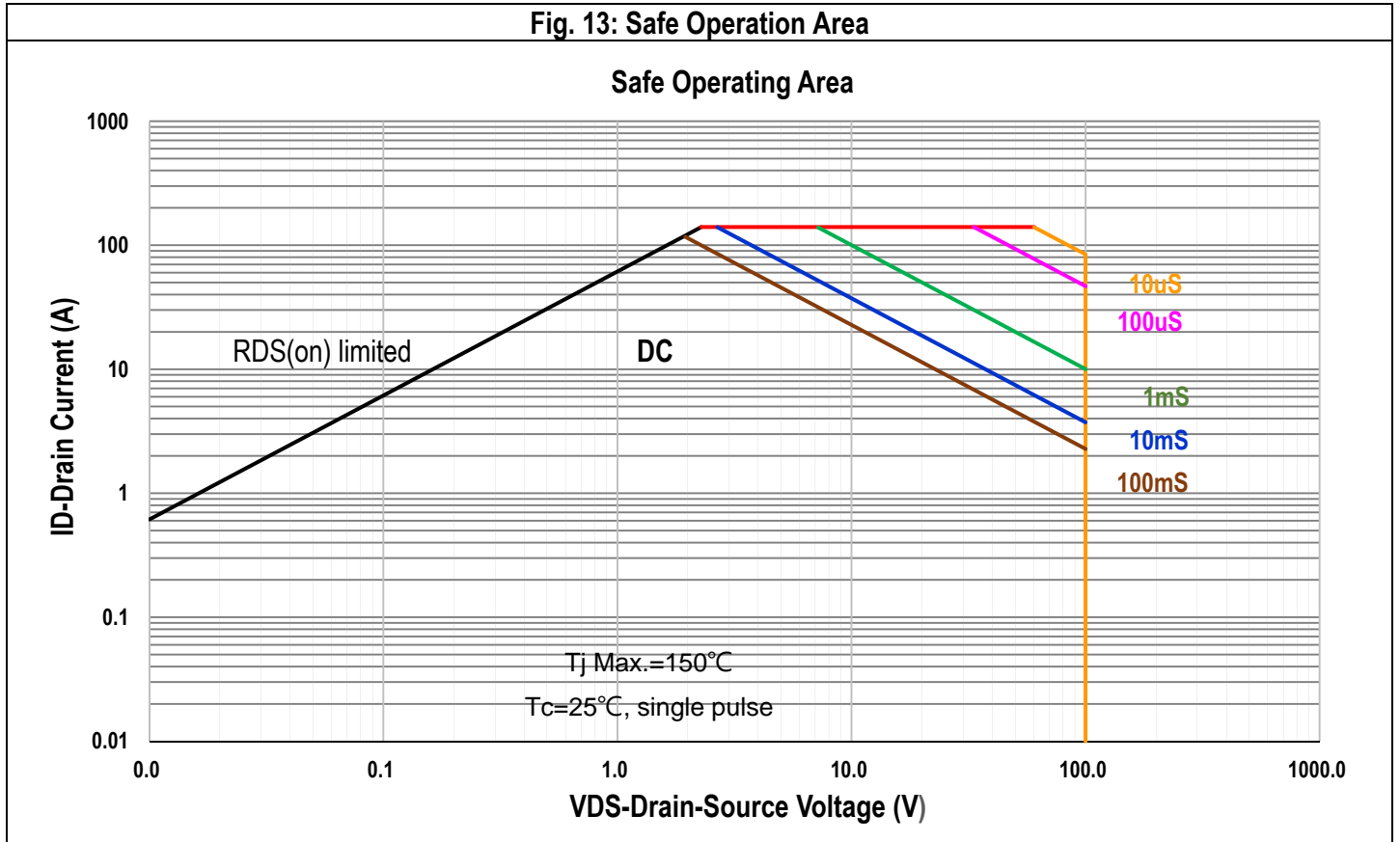
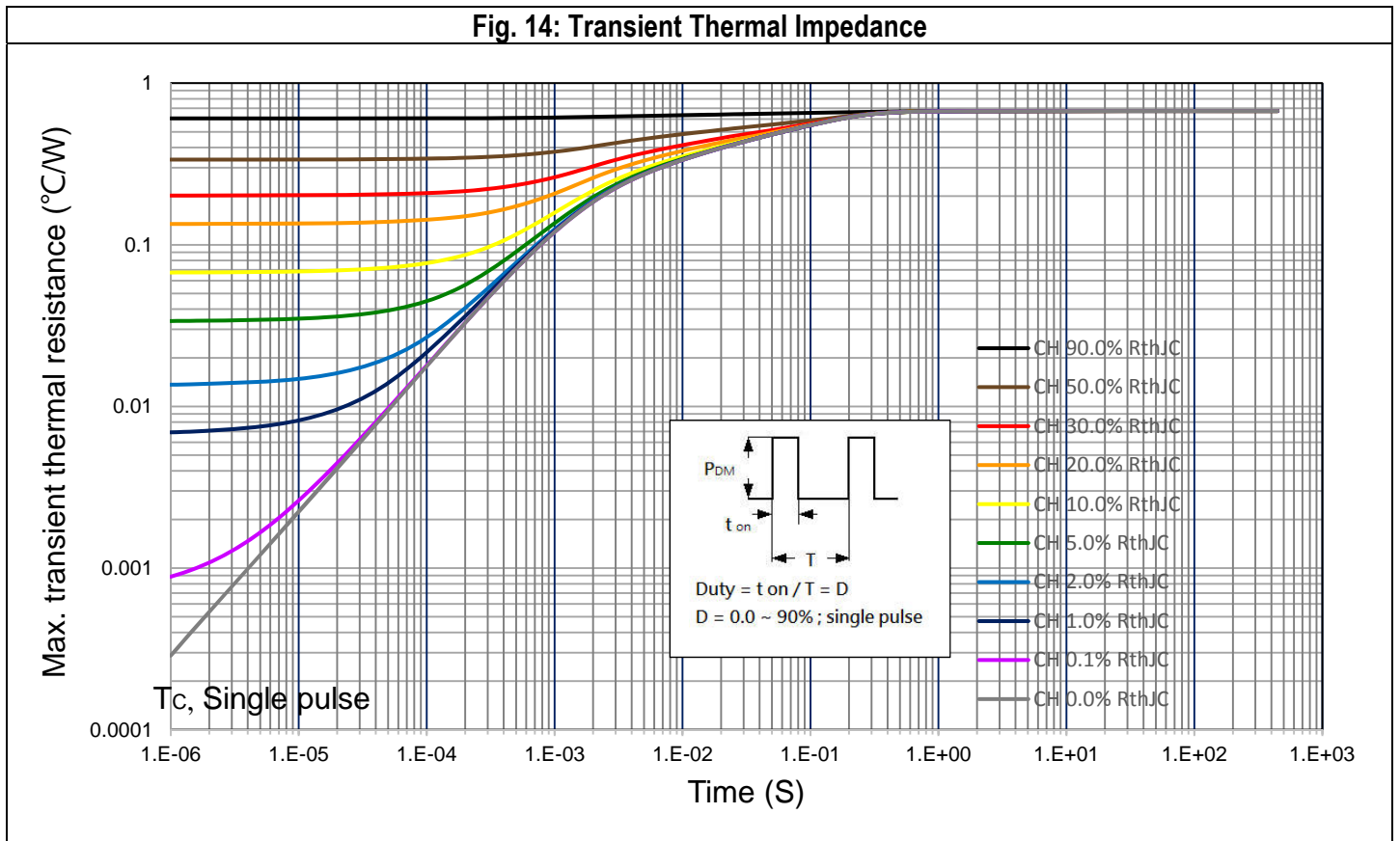
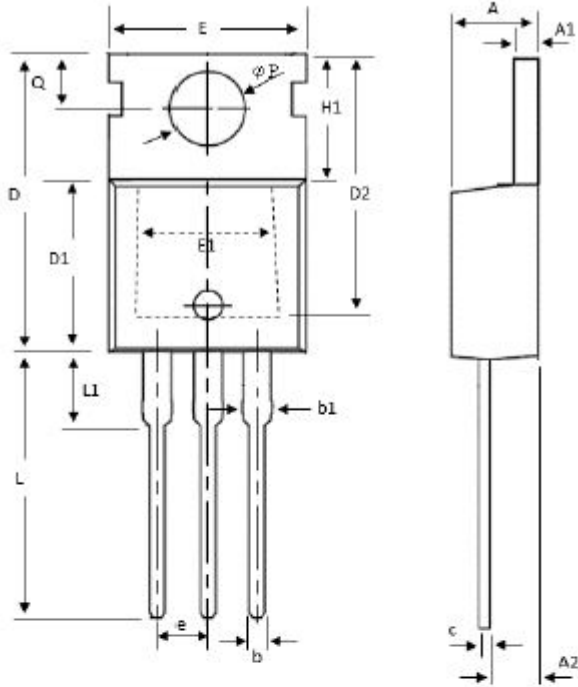


Fig. 14: Transient Thermal Impedance



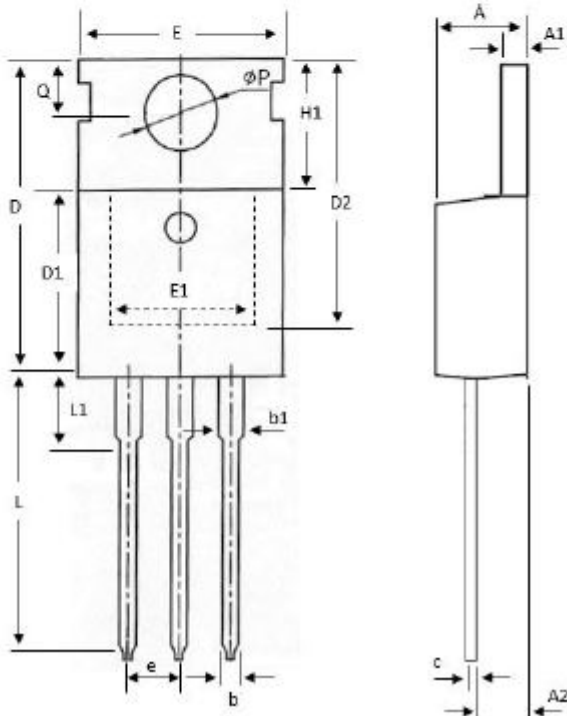
## Package of Dimension

### G-TYPE

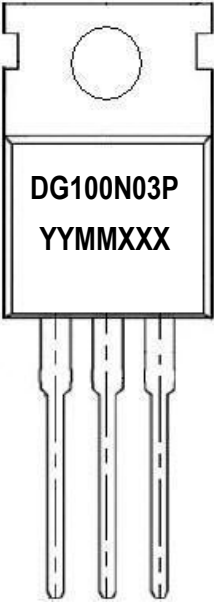


Symbol	Min	Nor	Max
A	4.20	4.45	4.70
A1	1.15	1.28	1.40
A2	2.20	2.45	2.70
b	0.70	0.83	0.95
b1	1.15	1.45	1.75
c	0.40	0.50	0.60
D1	8.80	9.10	9.40
D2	11.75	-	-
E	9.70	10.03	10.36
E1	6.86	-	-
e	2.54 BSC		
H1	6.25	6.55	6.85
L	12.75	13.38	14.00
L1	-	-	4.00
P	3.40	3.70	4.00
Q	2.60	2.80	3.00

### P-TYPE H-TYPE



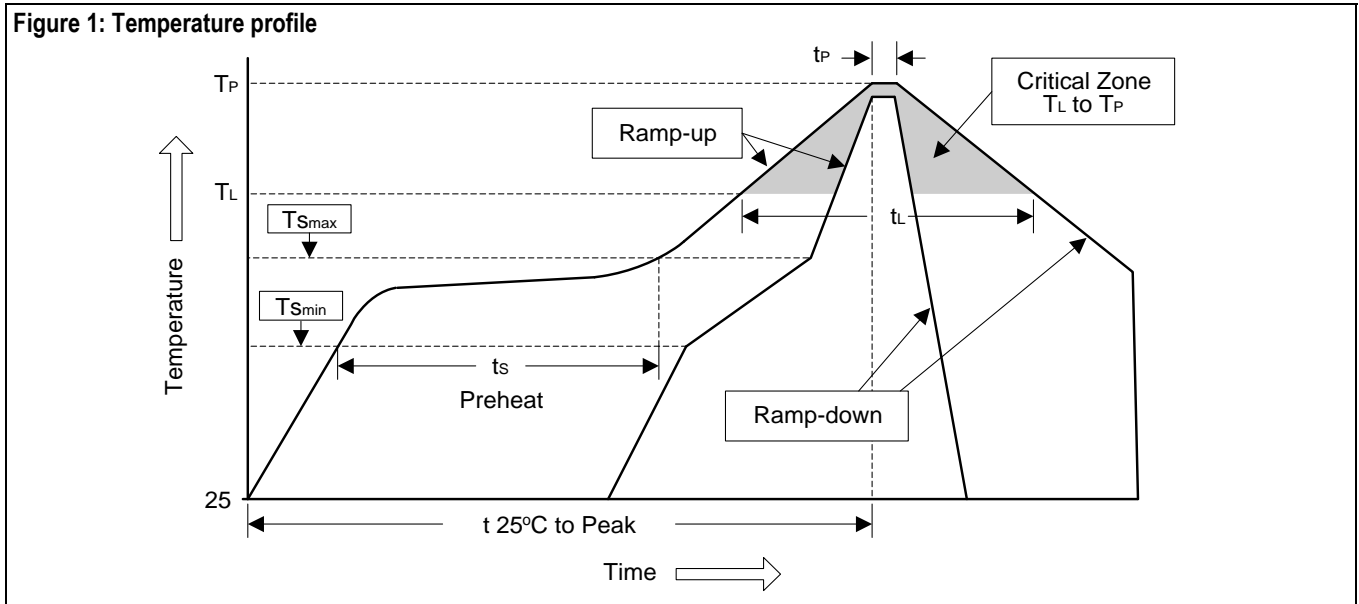
## Marking Information

TO-220 (P)	Marking Rule
<p>Laser Marking</p> 	<p><u>Line 1</u> : Device DG100N03P</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>

## Appendix-A

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

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



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T <sub>L</sub> to T <sub>P</sub> )	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T <sub>smin</sub> )	100°C	150°C
- Temperature Max (T <sub>smax</sub> )	150°C	200°C
- Time (min to max) (ts)	60 to 120 sec	60 to 180 sec
T <sub>smax</sub> to T <sub>L</sub>		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60 to 150 sec	60 to 150 sec
Peak Temperature (T <sub>P</sub> )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t <sub>P</sub> )	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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## Revision History

Document Revision History			
Device	Date	Revision	Description (major change from last revision)
DG100N03P	Jul-12-2023	07	<ul style="list-style-type: none"> <li>- Update symbol and package picture</li> <li>- <math>I_D</math> ; <math>I_{DM}</math> ; <math>I_{AR}</math> ; <math>P_D</math> ; <math>R_{\theta JC}</math> ; <math>R_{\theta JA}</math> ; <math>V_{GS(TH)}</math> ; <math>R_{DS(ON)}</math> ; <math>V_{SD}</math> ; <math>t_{rr}</math> ; <math>Q_{rr}</math> ; <math>I_{rm}</math> parameter revision</li> <li>- Add marking parameter both <math>I_S</math> and <math>I_{SM}</math></li> <li>- Operating characteristic diagrams Fig.1~ Fig.14 revision</li> <li>- Added package dimensions section.</li> <li>- Added land pattern section.</li> <li>- Added revision history section.</li> </ul>