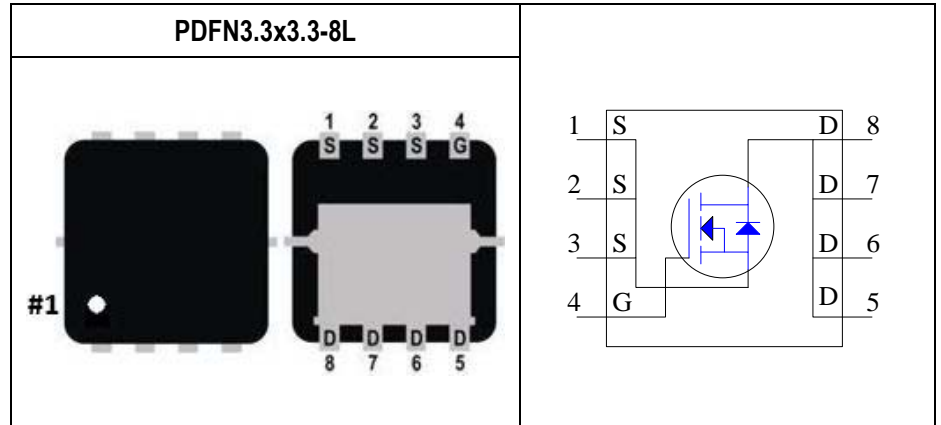


Parameter	Value	Unit
$V_{DSS}$	100	V
$R_{DS(ON) \text{ max. } V_{GS}=10V}$	10	m $\Omega$
$I_D$	40	A
$V_{GS(TH) \text{ Typ.}}$	1.6	V
$C_{iss} \text{ Typ.}$	1585	pF
$Q_{g10V} \text{ Typ.}$	33.1	nC
$E_{AS}$	13.4	mJ



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
DG100N13E	Halogen-Free	PDFN3.3x3.3-8L	E	Tape & Reel	5,000

## 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>	$I_D$	$T_C=25^\circ\text{C}$	40
		$T_C=100^\circ\text{C}$	25
Drain Current-Continuous <sup>Note 2</sup>	$I_D$	$T_A=25^\circ\text{C}$	9.6
		$T_A=70^\circ\text{C}$	7.6
Drain Current-Pulsed <sup>Note 3</sup>	$I_{DM}$	100	A
Avalanche Current	$I_{AR}$	16.4	A
Single Pulse Avalanche Energy <sup>Note 4</sup>	$E_{AS}$	13.4	mJ
Maximum Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	30.6
		$T_C=100^\circ\text{C}$	12.2
		$T_A=25^\circ\text{C}$	1.7
		$T_A=70^\circ\text{C}$	1.1
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	-	-	4.08	$^\circ\text{C/W}$
Thermal resistance, Junction-Ambient <sup>Note 5</sup>	$R_{\theta JA}$	Steady State	-	-	72.99	$^\circ\text{C/W}$

### 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  $T_J=25^\circ\text{C}$ ,  $L=0.1\text{mH}$ ,  $R_g=25\Omega$ ,  $I_D=16.4\text{A}$ ,  $V_{GS}=10\text{V}$ .
- 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<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> =100V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =100V, 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

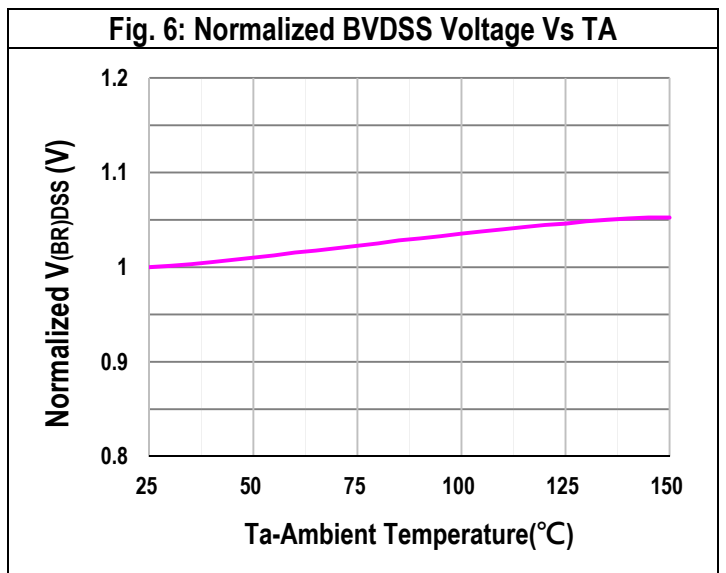
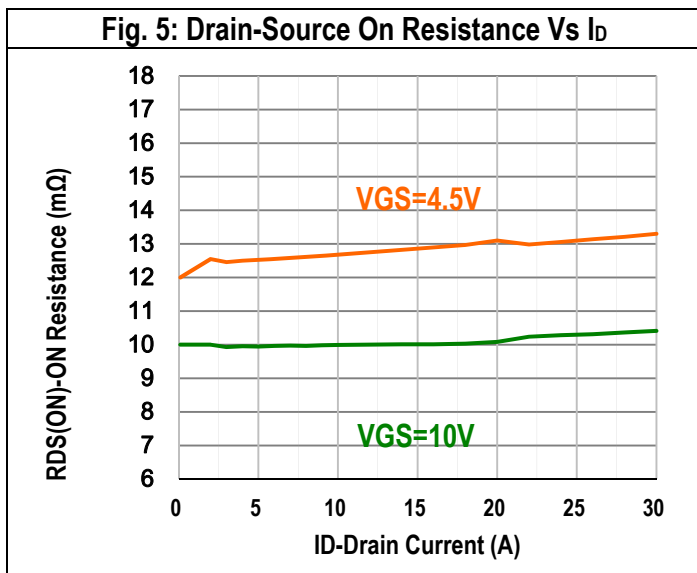
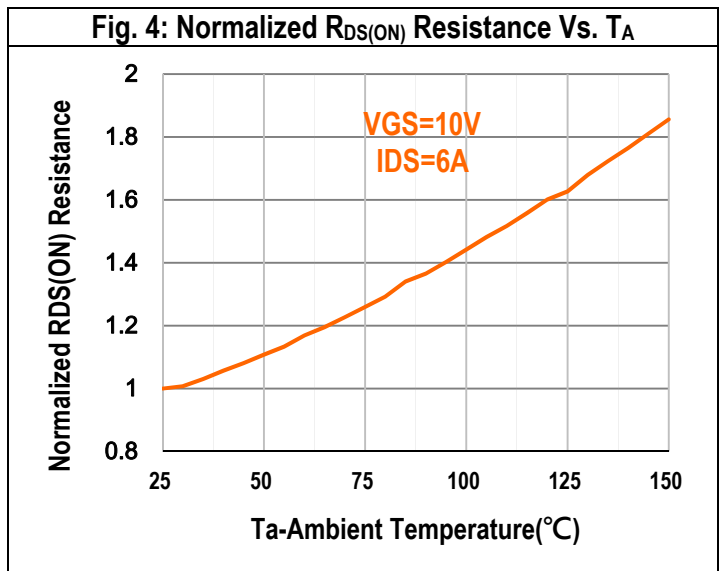
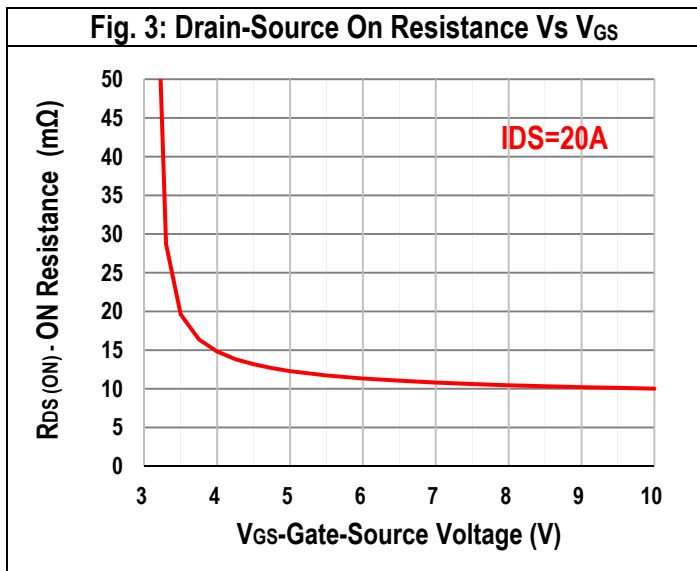
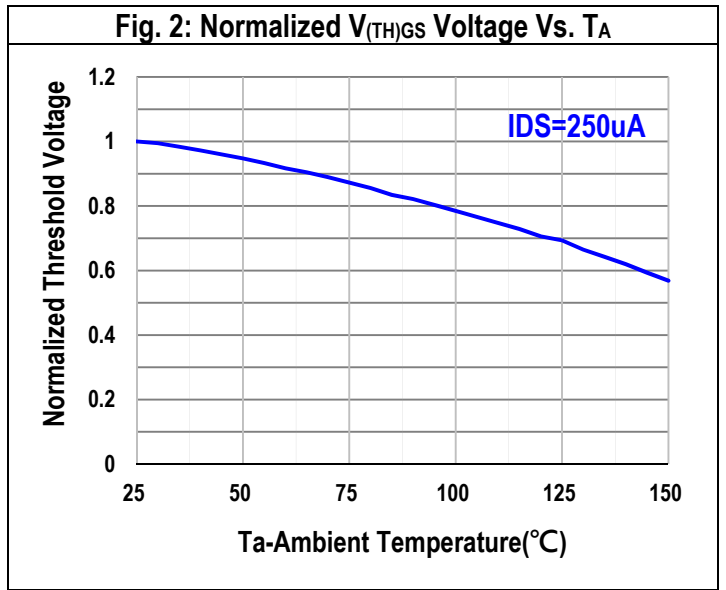
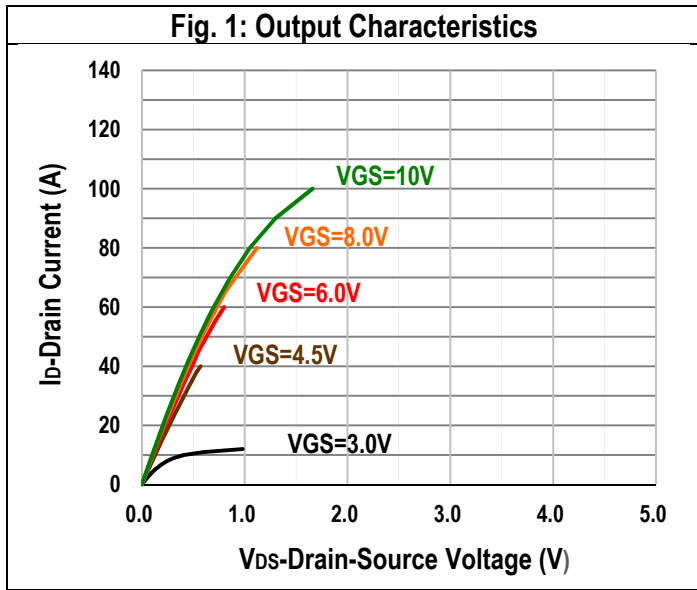
STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1.4	1.6	1.8	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>DS</sub> =20A	-	9.3	10	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =10A	-	11.8	13.6	mΩ
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	-	0.69	-	Ω
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>DS</sub> =20A	-	25	-	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	-	1585	-	pF
Output Capacitance	C <sub>oss</sub>	V <sub>DD</sub> =100V, V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	270	-	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	-	8.4	-	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	-	7.5	-	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	-	16.5	-	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	-	23.9	-	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	-	8.9	-	nS

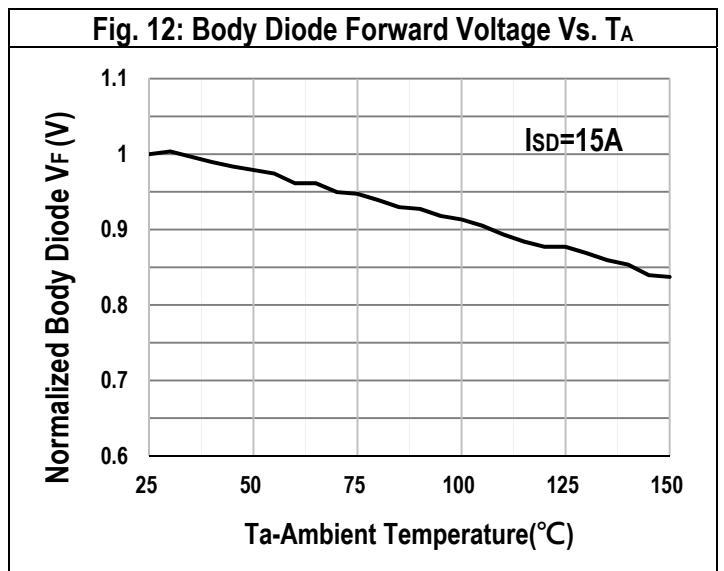
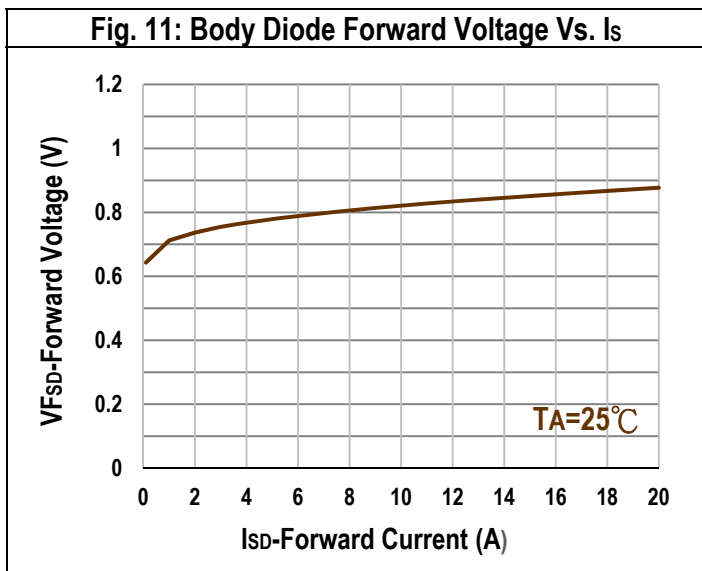
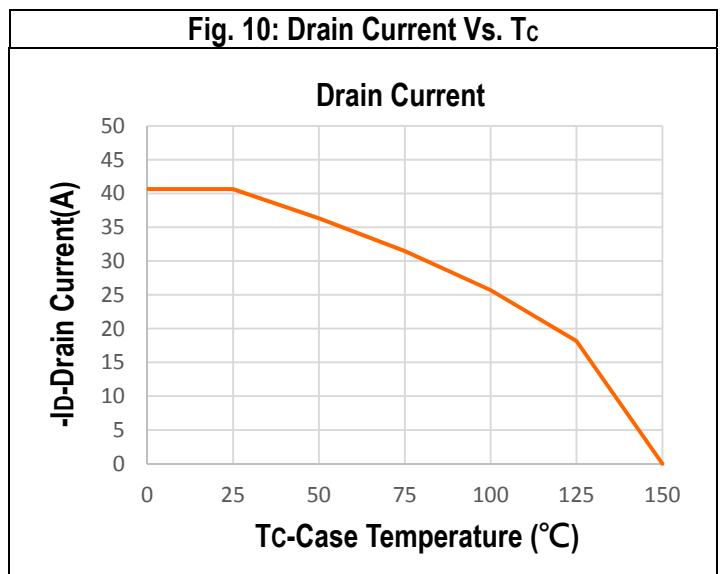
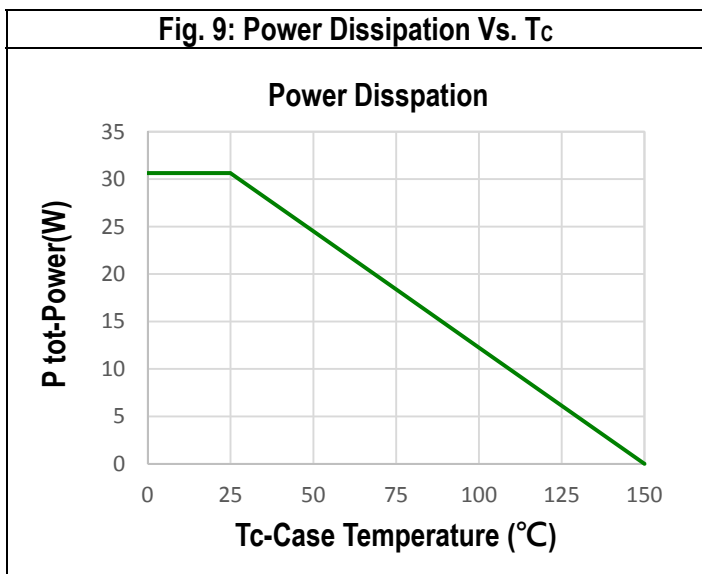
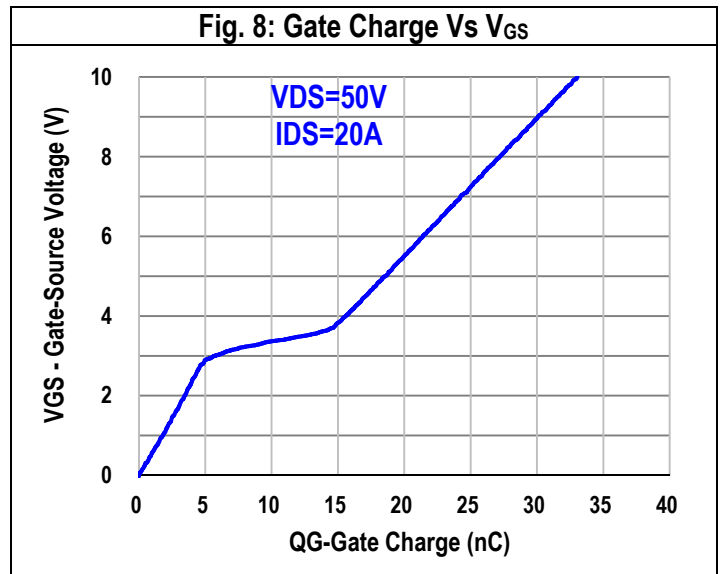
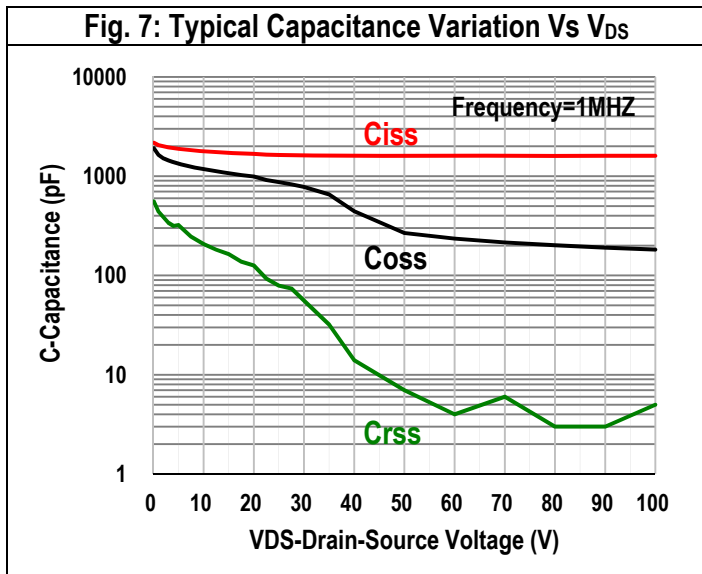
GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q <sub>gs</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10V	-	5.7	-	nC
Gate charge at threshold	Q <sub>g(th)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10V	-	3	-	nC
Gate to Drain Charge	Q <sub>gd</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10V	-	8.9	-	nC
Switching charge	Q <sub>sw</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10V	-	11.6	-	nC
Gate charge total	Q <sub>g 10V</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10V	-	33.1	-	nC
Gate plateau voltage	V <sub>plateau</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10V	-	3.3	-	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	-	24.2	-	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	-	-	20	A
Body Diode pulse current	I <sub>SM</sub>	T <sub>C</sub> =25°C	-	-	100	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	-	32.8	-	nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	74.2	-	nC
Body Diode Reverse Recovery Current	I <sub>rm</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	3.9	-	A

Typical Operating Characteristics



## Typical Operating Characteristics



4. Typical Operating Characteristics

Fig. 13: Safe Operation Area

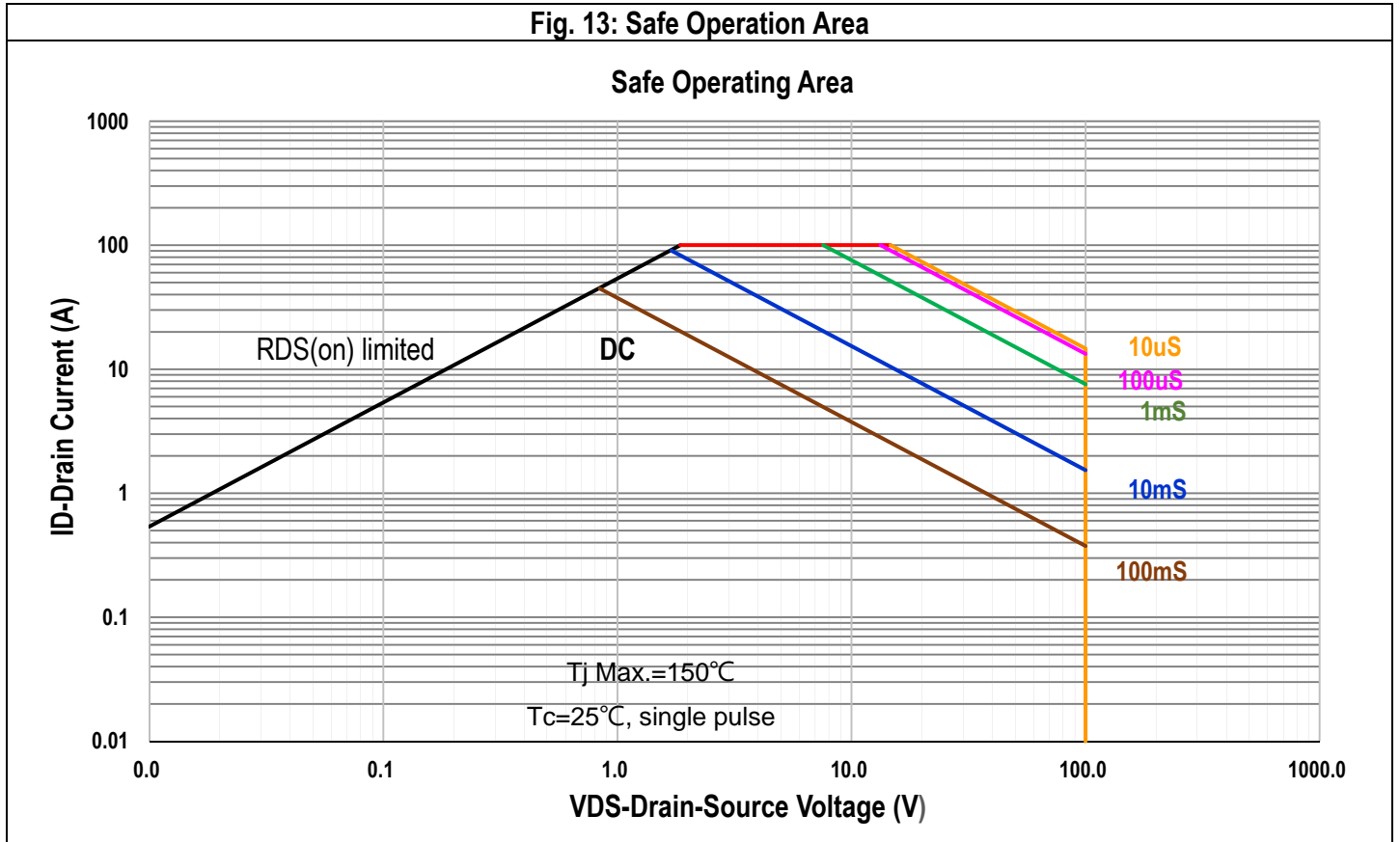
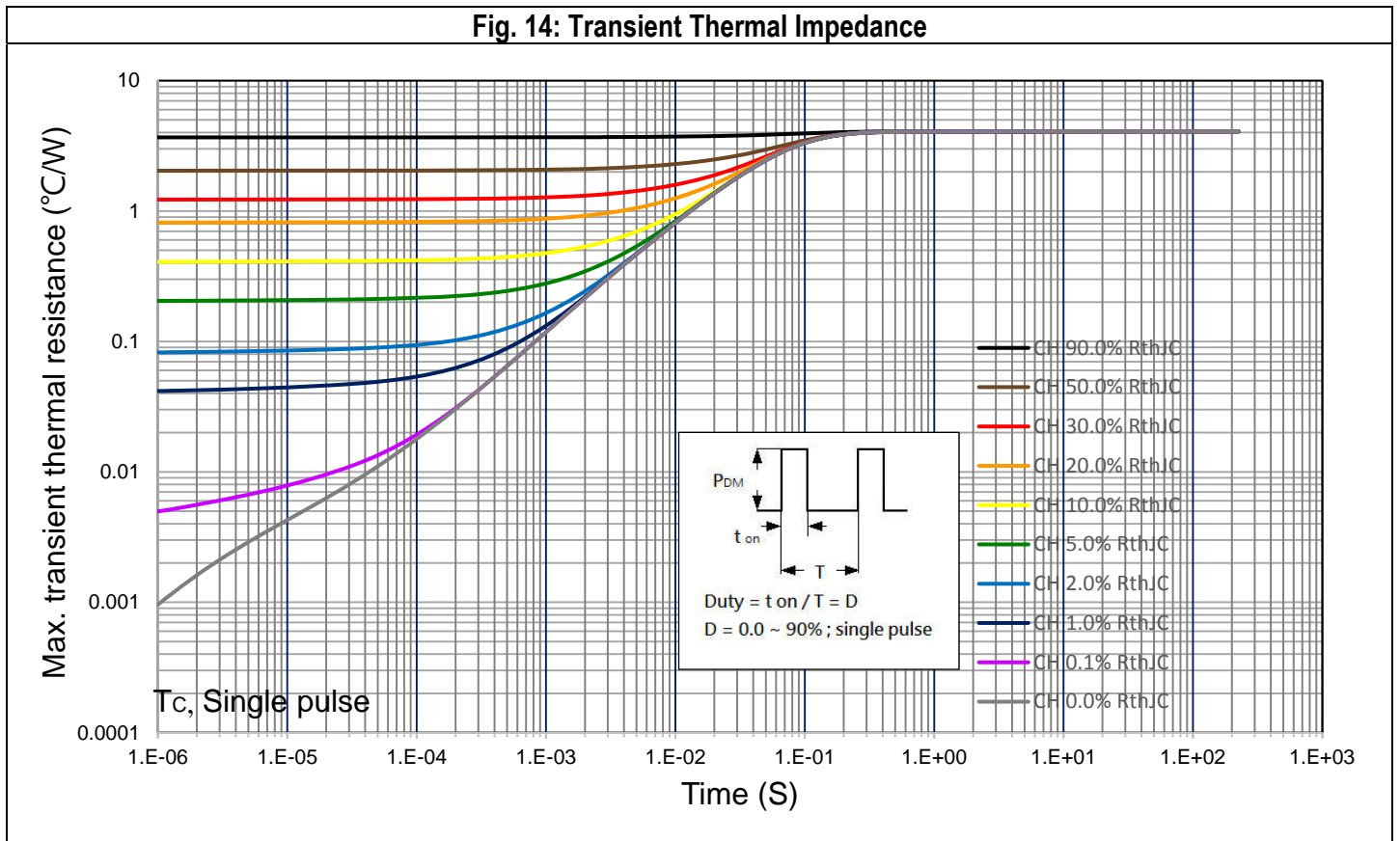
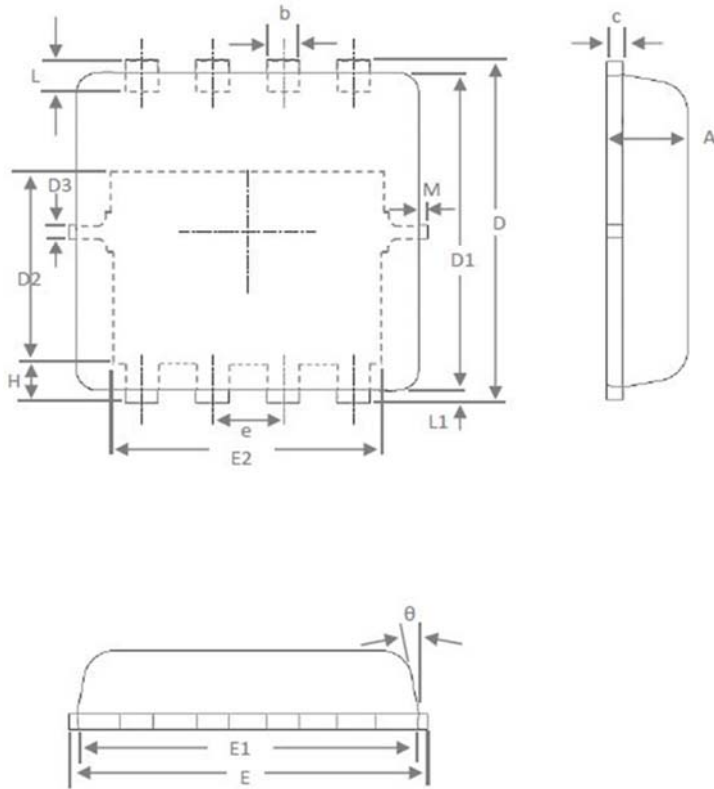


Fig. 14: Transient Thermal Impedance

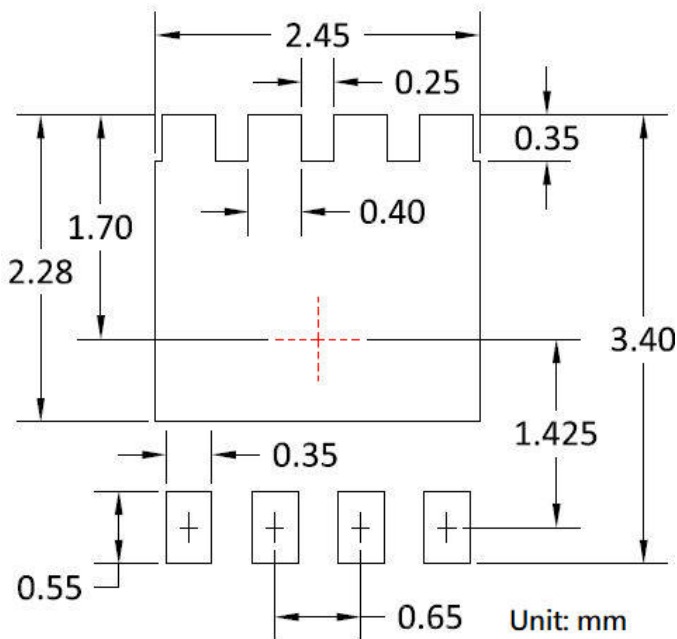


## Package of Dimension



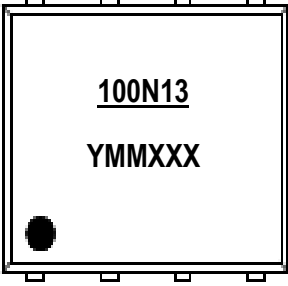
Symbol	Min	Nor	Max
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	-	0.13	-
E	3.00	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	-	0.13	-
θ	-	10°	12°
M	-	-	0.15

## Land Pattern (Footprint)



- Note 1:** Land pattern (Footprint) design is for reference only.
- Note 2:** Package body sizes exclude mold flash and burrs.
- Note 3:** Dimension is measured in gauge plane.
- Note 4:** Tolerance 0.1mm unless otherwise specified.

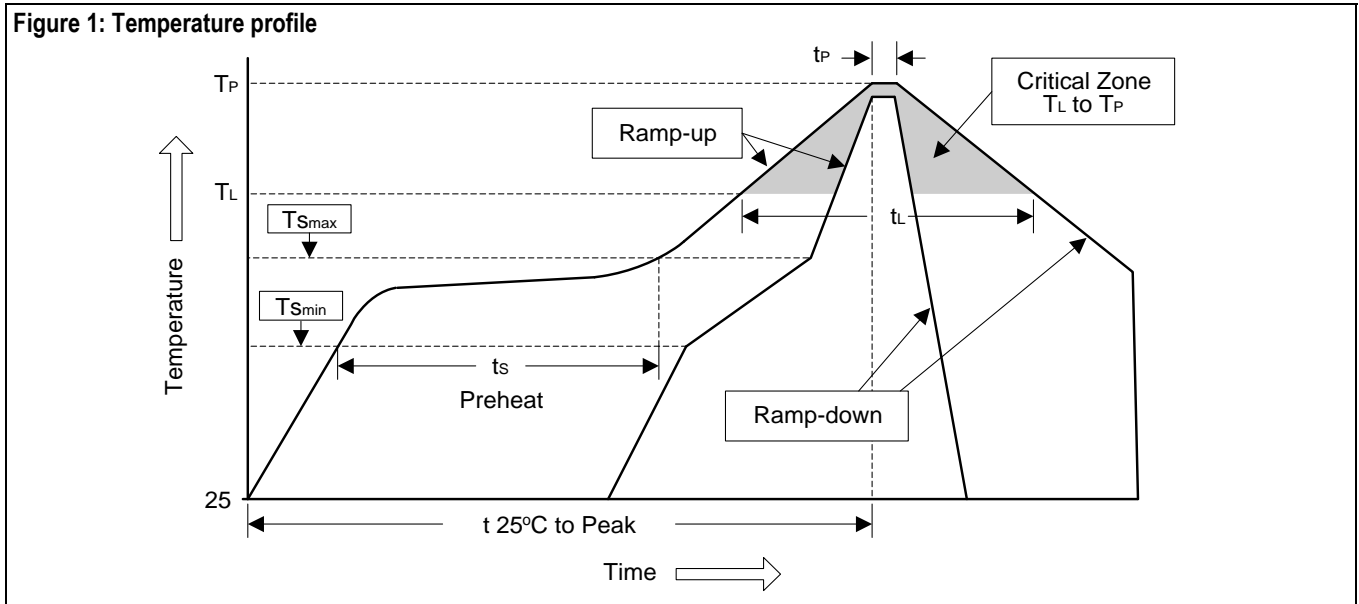
## Marking Information

PDFN3.3x3.3-8L (E)	Marking Rule
<p>Laser Marking</p> 	<p><u>Line 1</u> : Device 100N13</p> <p><u>Line 2</u> : Date Code YMMXXX</p> <p>Y : 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 ( $T_L$ to $T_P$ )	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min ( $T_{Smin}$ )	100°C	150°C
- Temperature Max ( $T_{Smax}$ )	150°C	200°C
- Time (min to max) ( $t_s$ )	60 to 120 sec	60 to 180 sec
$T_{Smax}$ to $T_L$		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature ( $T_L$ )	183°C	217°C
- Time ( $t_L$ )	60 to 150 sec	60 to 150 sec
Peak Temperature ( $T_P$ )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_P$ )	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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