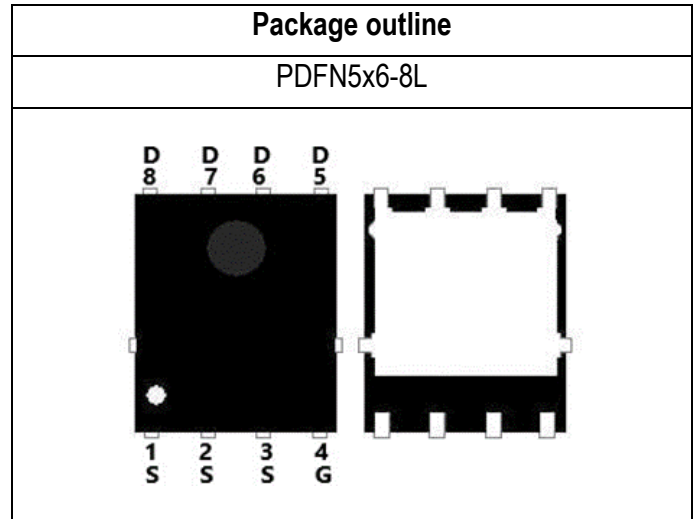


Key parameter	N <sub>channel</sub>	Unit
V <sub>(BR)DSS</sub> min.	100	V
R <sub>DS(ON)</sub> max. V <sub>GS</sub> =10V	4.8	mΩ
V <sub>GS(TH)</sub> Typ.	2.8	V
I <sub>D</sub>	95.7	A
C <sub>iss</sub> Typ.	6629	pF
Q <sub>g</sub> 10V Typ.	127	nC
E <sub>AS</sub>	96.8	mJ



### Description

The DG100N02Q uses double-gate structure of MOSFET to provide excellent electrical parameter. There is high speed switching capacity, low R<sub>DS(ON)</sub> resistance, low gate charge and stable characteristics for these devices. Moreover, it is a helpful choose for raise efficiency or reduce consumption in circuit. These features combine to be an advantage design for use in wide variety of application including converter and inverter design.

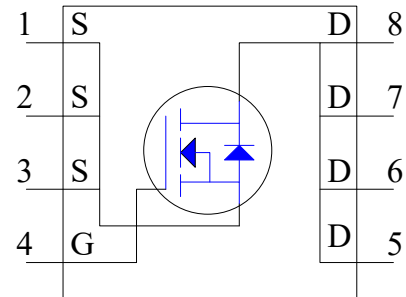
### Features

- ◇ Fast switch capacity
- ◇ Low R<sub>DS(ON)</sub> resistance
- ◇ Low input capacitance
- ◇ Low Switching Loss
- ◇ Ruggedness commutation capability
- ◇ Pb-free lead plating; RoHS compliant

### Potential application

- AC-DC adaptor
- DC-DC converter
- Load Switch
- Electric tool application
- Motor/Fan driving application
- Synchronous Rectifier for Power Delivery

### Symbol and Pin assignment



### Order Information

Item	Description
1. Order Code	DG100N02Q
2. Part Number	DG100N02Q
3. Package Type	PDFN5x6-8L
4. Package Code	Q
5. Packing Type	Tape & Reel
6. Quantity in Pack	2,500
7. RoHS Status	Halogen-Free

## Content

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2.	Thermal Resistance Ratings -----	3
3.	Electrical Characteristics -----	4
4.	Typical Operating Characteristics Diagram -----	5-7
5.	Marking Information -----	8
6.	Package of Dimension -----	9
7.	Land pattern (Footprint) -----	10
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## 1. Absolute Maximum Ratings (T<sub>J</sub>=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V <sub>DS</sub>	100	V
Gate-Source Voltage		V <sub>GS</sub>	±20	V
Drain Current-Continuous <sup>Note 1</sup>	T <sub>C</sub> =25°C	I <sub>D</sub>	95.7	A
	T <sub>C</sub> =100°C		60.5	A
Drain Current-Continuous <sup>Note 2</sup>	T <sub>A</sub> =25°C	I <sub>D</sub>	20.1	A
	T <sub>A</sub> =70°C		16.1	A
Drain Current-Pulsed <sup>Note 3</sup>	T <sub>A</sub> =25°C	I <sub>DM</sub>	382	A
Avalanche Current		I <sub>AR</sub>	44	A
Single Pulse Avalanche Energy <sup>Note 4</sup>		E <sub>AS</sub>	96.8	mJ
Maximum Power Dissipation	T <sub>C</sub> =25°C	P <sub>D</sub>	72.2	W
	T <sub>C</sub> =100°C		28.9	W
	T <sub>A</sub> =25°C		3.1	W
	T <sub>A</sub> =70°C		2.0	W
	Derate Factor Above TC=25°C		0.57	W/°C
Max. Operating Junction Temperature		T <sub>J</sub>	150	°C
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

## 2. Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-Case	R <sub>ΘJC-N</sub>	Please refer to Note 5	-	-	1.73	°C/W
Thermal resistance, Junction-Ambient	R <sub>ΘJA-N</sub>	Please refer to Note 5	-	-	39.14	°C/W

### Notes:

- Limited by silicon chip capability and R<sub>ΘJC-N</sub> junction-to-case thermal resistance.
- The maximum current rating is limited by package and R<sub>ΘJA-P</sub> junction-to-ambient thermal resistance.
- Must be ensure junction temperature does not exceed 150-degree C. (Pulse Width ≤ 380uS, Duty ≤ 2%)
- Limited by T<sub>Jmax</sub>, starting T<sub>J</sub>=25°C, L=0.1mH, R<sub>g</sub>=25Ω, I<sub>D</sub>=44A, V<sub>GS</sub>=10V.
- The value of thermal resistance is measured with the single device mounted on 1 inch<sup>2</sup> FR-4 PCB with 2 oz. copper under a still air environment temperature is 25°C based on JEDEC standard JESD51-14 and JESD51-2a. Thermal resistance obtained depends on the user's specific board design and given application.

### 3. 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	-	-	100	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA

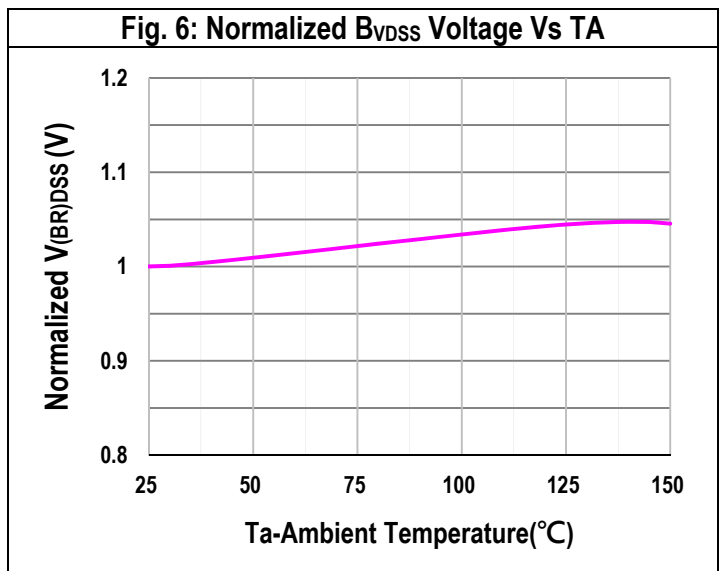
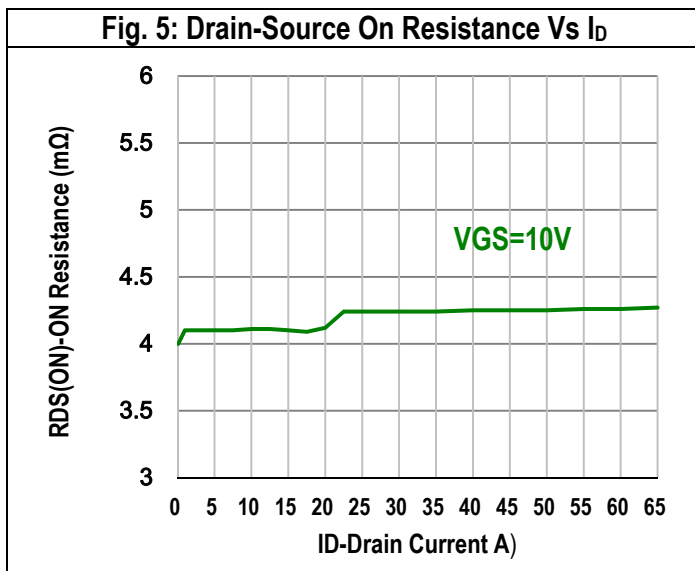
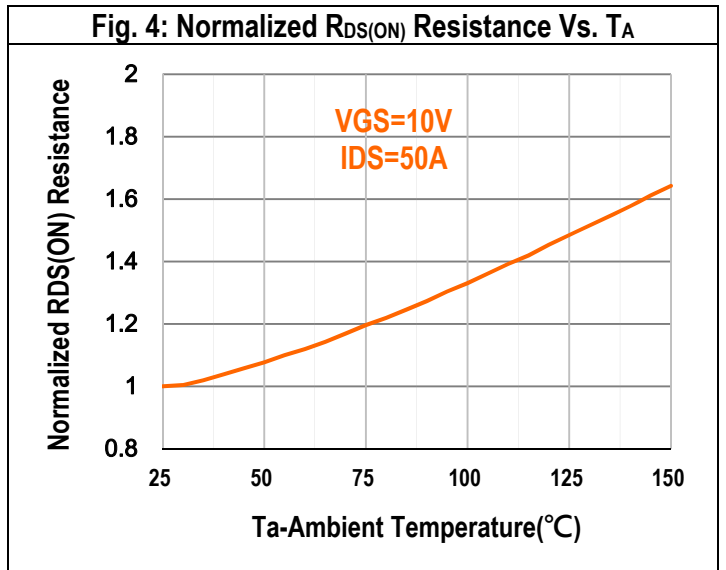
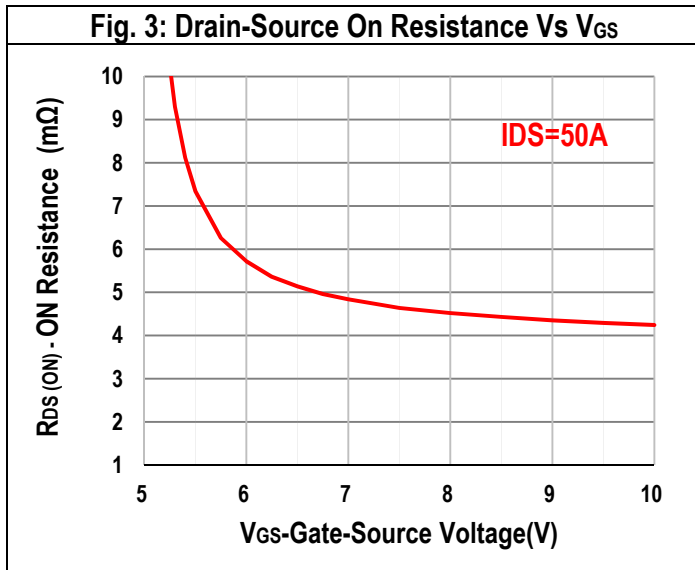
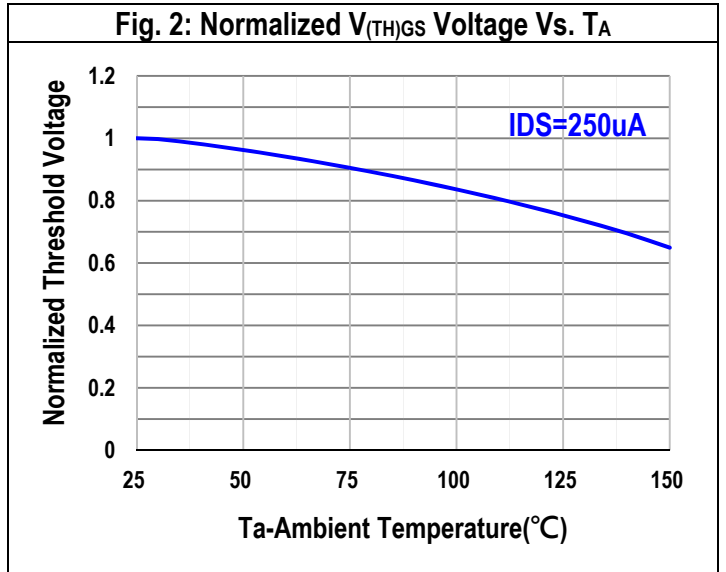
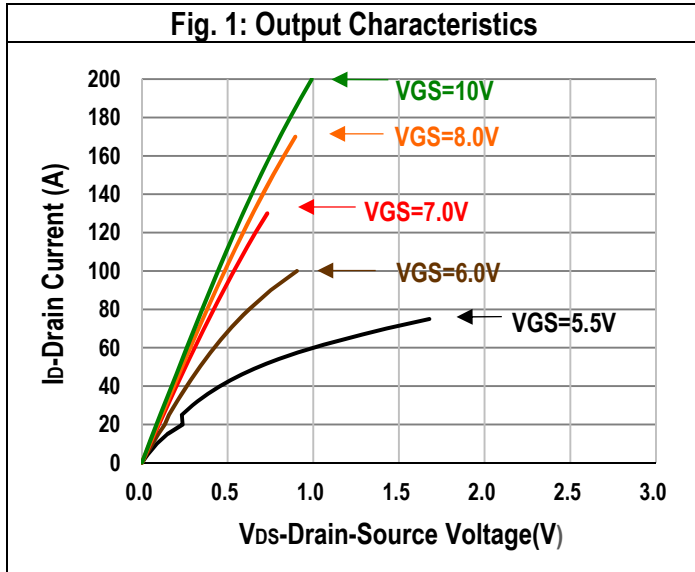
STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	2.6	2.8	3.3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>DS</sub> =50A	-	4.2	4.8	mΩ
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	-	0.9	-	Ω
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>DS</sub> =20A	-	30	-	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	-	6629	-	pF
Output Capacitance	C <sub>oss</sub>	V <sub>DD</sub> =100V, V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	718	-	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	-	30.6	-	pF
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =50A, R <sub>GEN</sub> =3.3Ω	-	23	-	nS
Rise Time	t <sub>r</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =50A, R <sub>GEN</sub> =3.3Ω	-	58	-	nS
Turn-Off Delay Time	T <sub>d(off)</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =50A, R <sub>GEN</sub> =3.3Ω	-	65.8	-	nS
Fall Time	t <sub>f</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =50A, R <sub>GEN</sub> =3.3Ω	-	37.2	-	nS

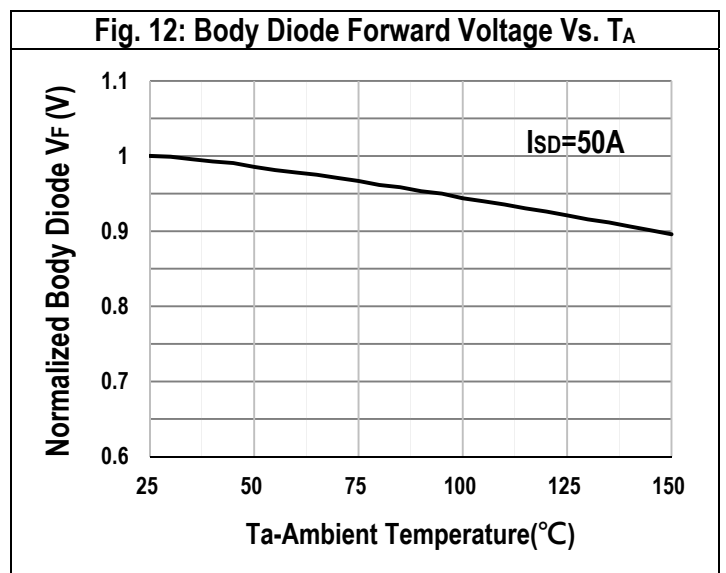
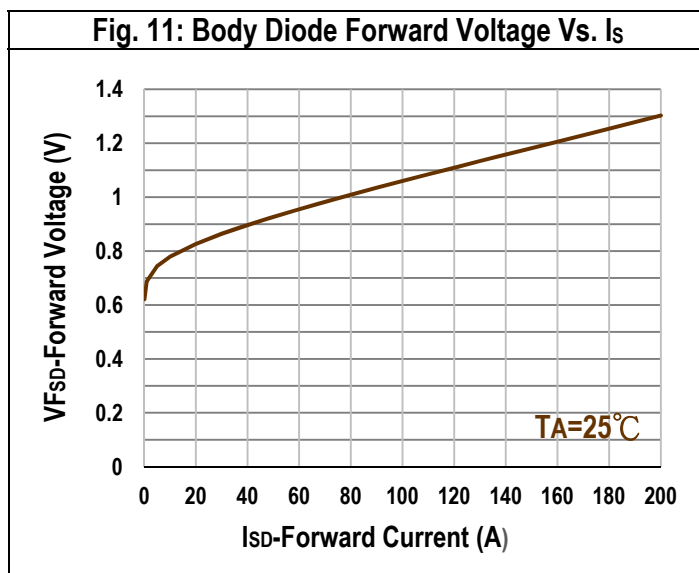
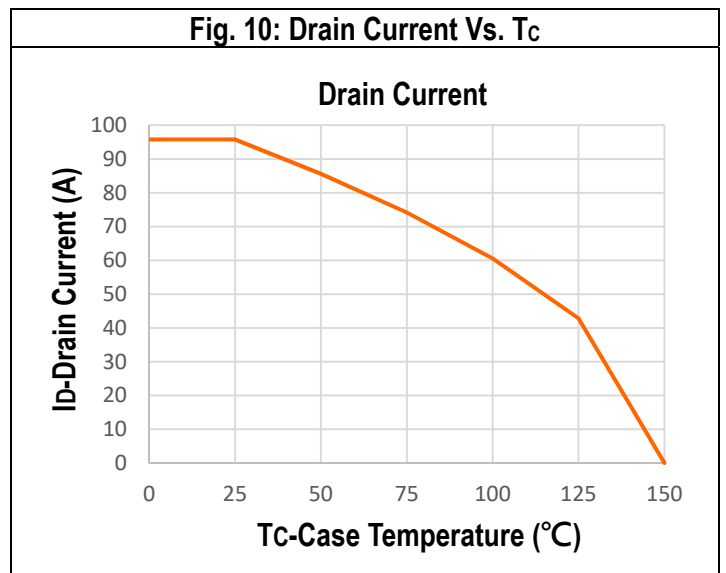
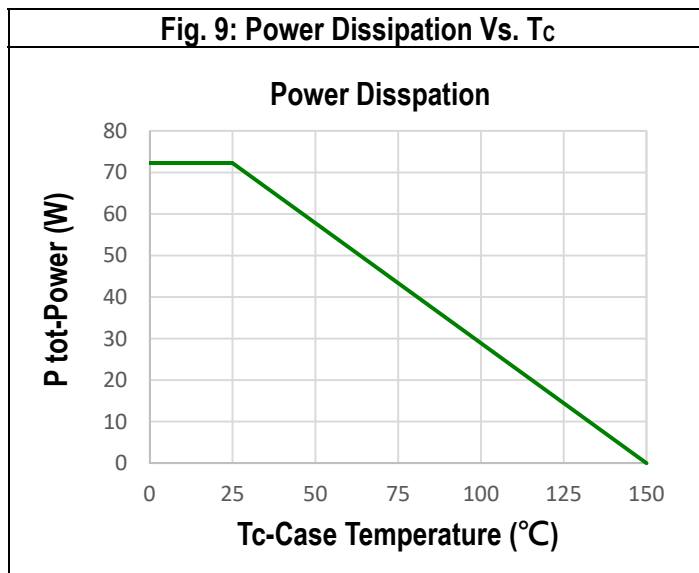
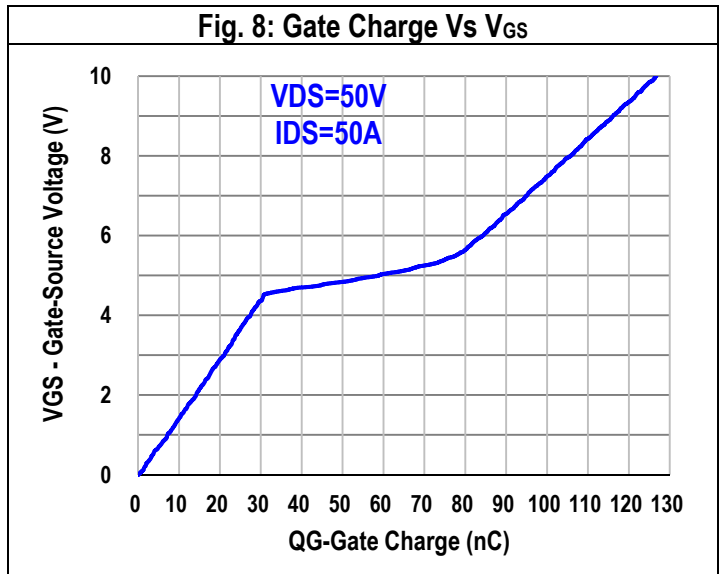
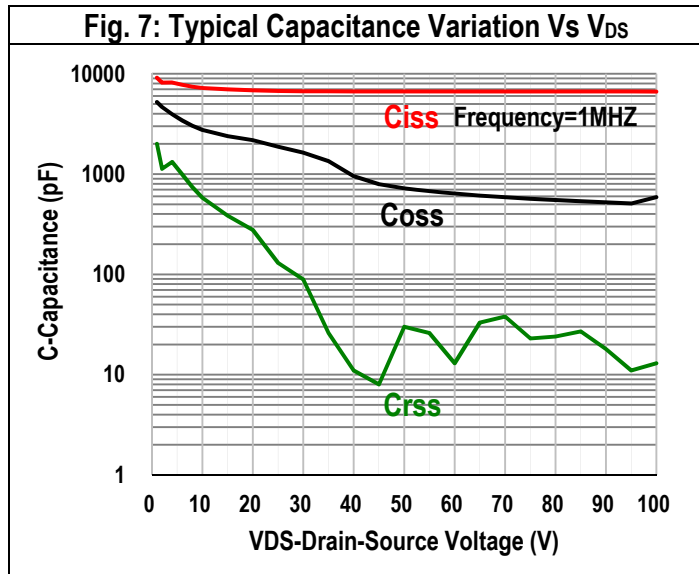
GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q <sub>gs</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =50A, V <sub>GS</sub> =0 to 10V	-	32.8	-	nC
Gate charge at threshold	Q <sub>g(th)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =50A, V <sub>GS</sub> =0 to 10V	-	20.5	-	nC
Gate to Drain Charge	Q <sub>gd</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =50A, V <sub>GS</sub> =0 to 10V	-	45.9	-	nC
Switching charge	Q <sub>sw</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =50A, V <sub>GS</sub> =0 to 10V	-	58.1	-	nC
Gate charge total	Q <sub>g 10V</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =50A, V <sub>GS</sub> =0 to 10V	-	127	-	nC
Gate plateau voltage	V <sub>plateau</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =?A, V <sub>GS</sub> =0 to 10V	-	5.0	-	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	-	81.1	-	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	-	-	95.7	A
Body diode pulse current	I <sub>SM</sub>	T <sub>C</sub> =25°C	-	-	200	A
Body diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =50A	-	0.92	1.0	V
Body diode reverse recovery time	t <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =50A, di/dt=100A/μs	-	64.8	-	nS
		V <sub>DD</sub> =50V, I <sub>F</sub> =50A, di/dt=200A/μs	-	52	-	nS
Body diode reverse recovery charge	Q <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =50A, di/dt=100A/μs	-	87.7	-	nC
		V <sub>DD</sub> =50V, I <sub>F</sub> =50A, di/dt=200A/μs	-	129	-	nC
Body diode peak reverse recovery charge	I <sub>rm</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =50A, di/dt=100A/μs	-	2.5	-	A
		V <sub>DD</sub> =50V, I <sub>F</sub> =50A, di/dt=200A/μs	-	4.6	-	A

## 4. Typical Operating Characteristics



4. Typical Operating Characteristics



4. Typical Operating Characteristics

Fig. 13: Safe Operation Area

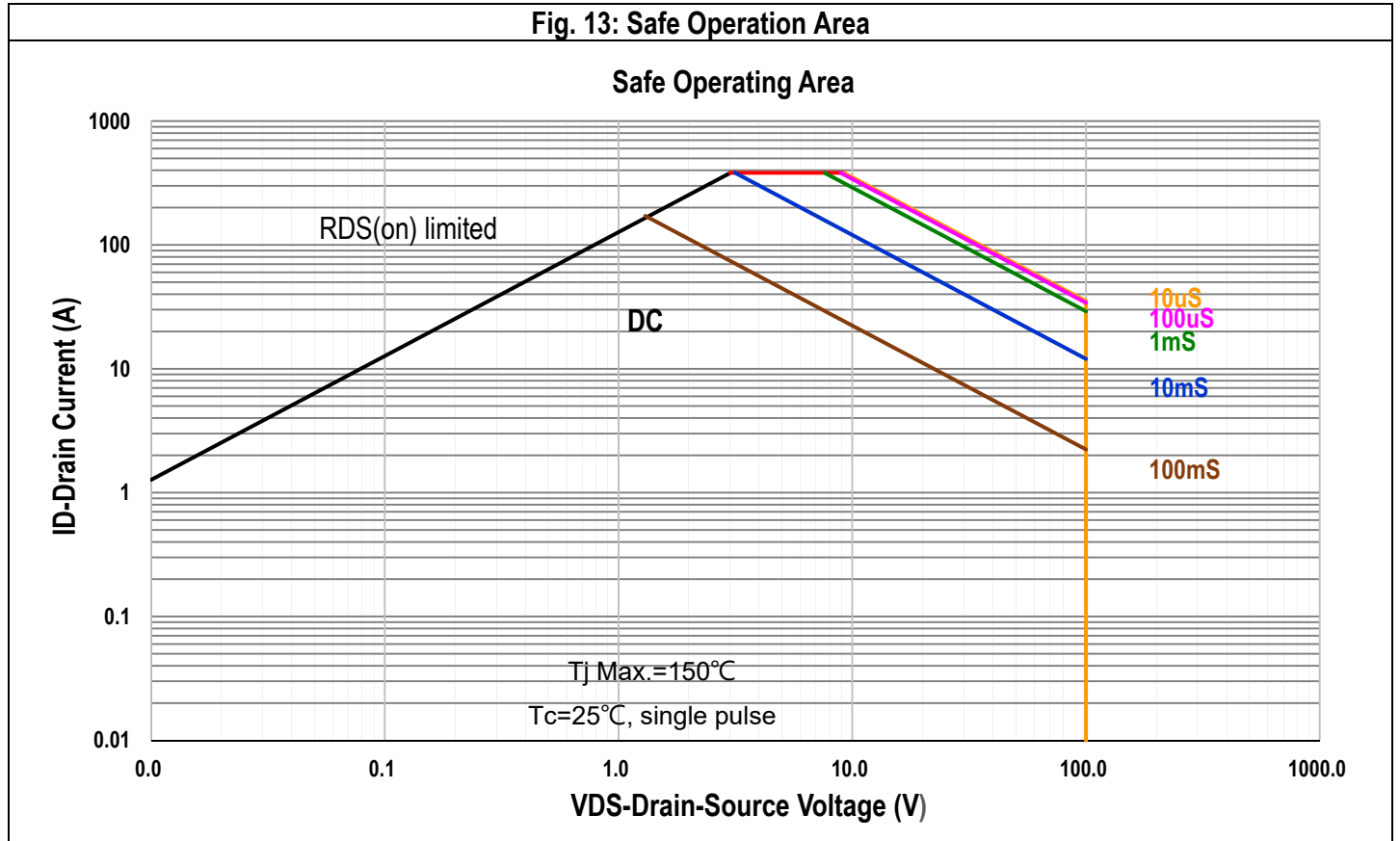
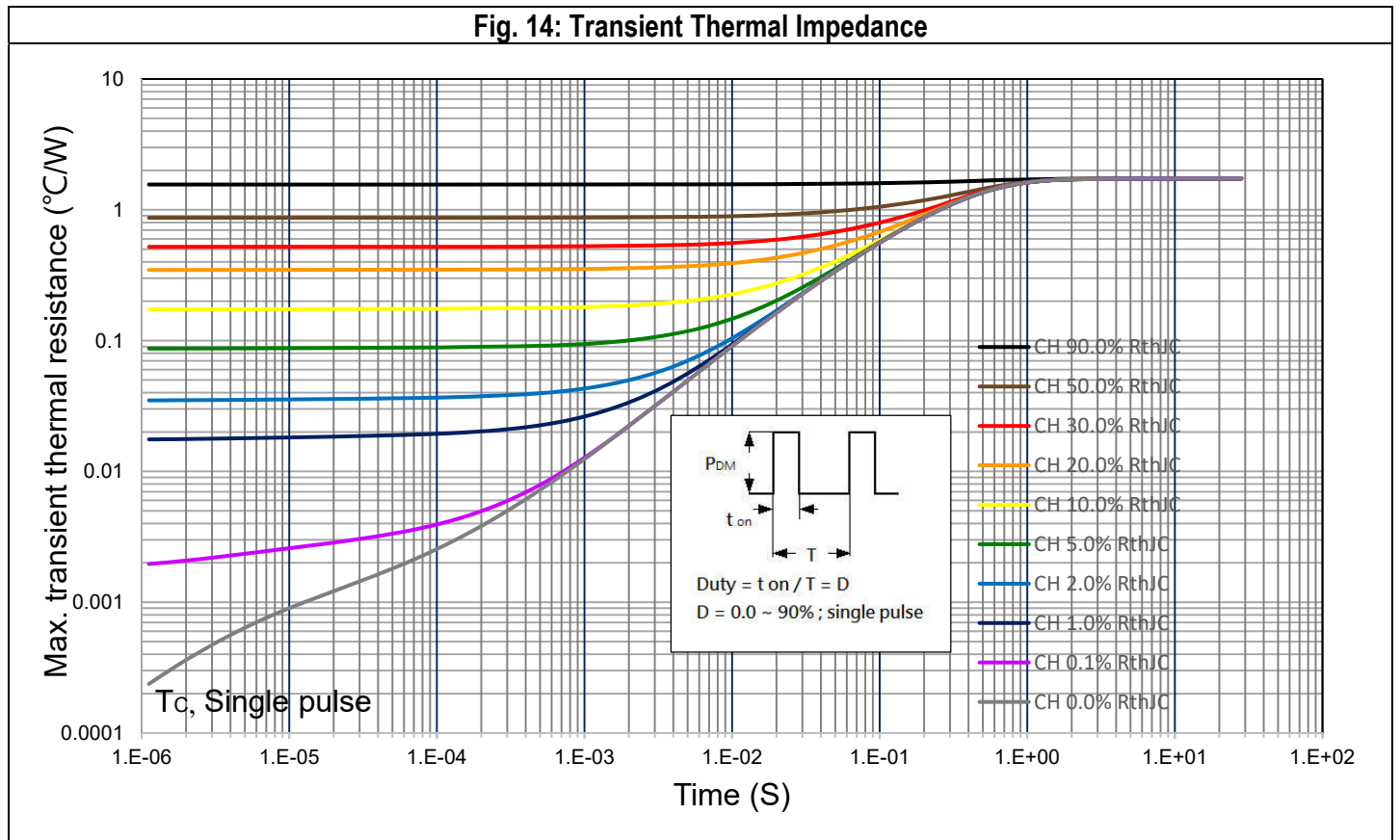



Fig. 14: Transient Thermal Impedance



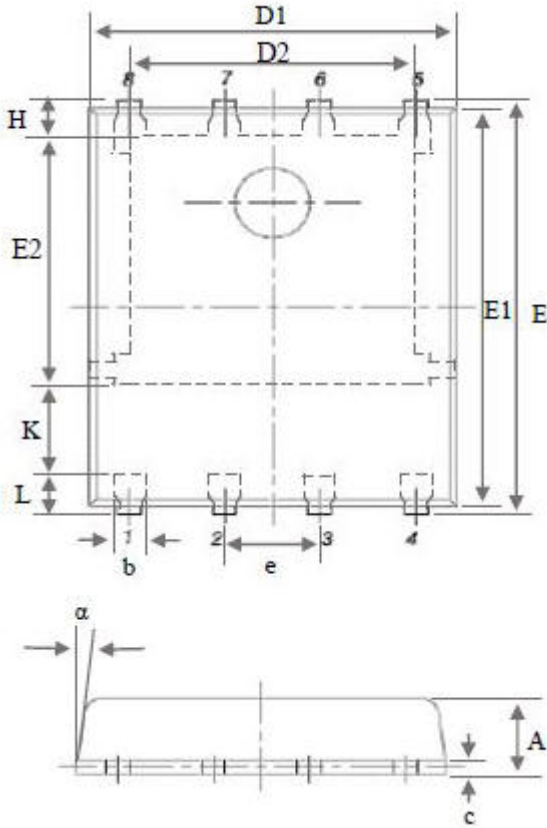
## 5. Marking Information

PDFN5x6-8L (Q)	Marking Rule
<p>Laser Marking</p> 	<p><u>Line 1</u> : Device DG100N02Q</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>



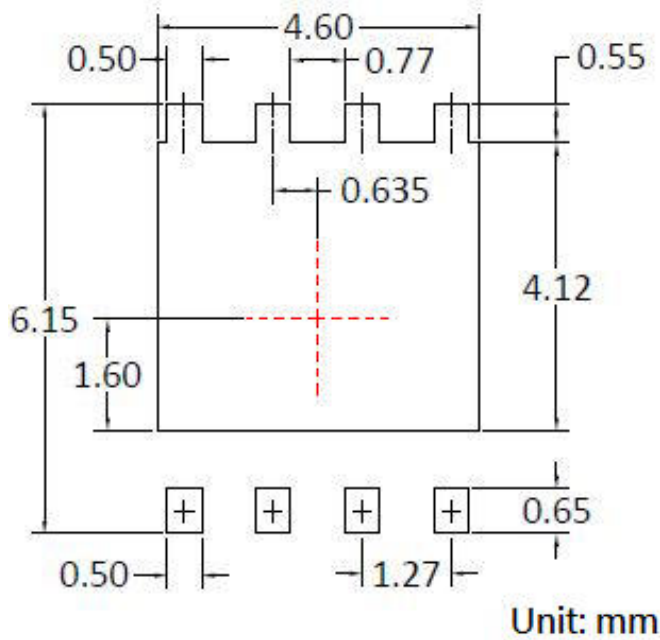
## 6. Package of Dimension

Package type: PDFN5x6-8L



Symbol	Min	Nor	Max
A	0.90	1.04	1.17
b	0.33	0.42	0.51
C	0.06	0.20	0.35
D1	4.80	5.10	5.40
D2	3.61	3.96	4.31
E	5.90	6.03	6.15
E1	5.65	5.75	5.85
E2	3.30	3.54	3.78
e	1.27 BSC		
H	0.38	0.50	0.61
L	0.38	0.55	0.71
L1	0.05	0.15	0.25

7. Land pattern (Footprint)

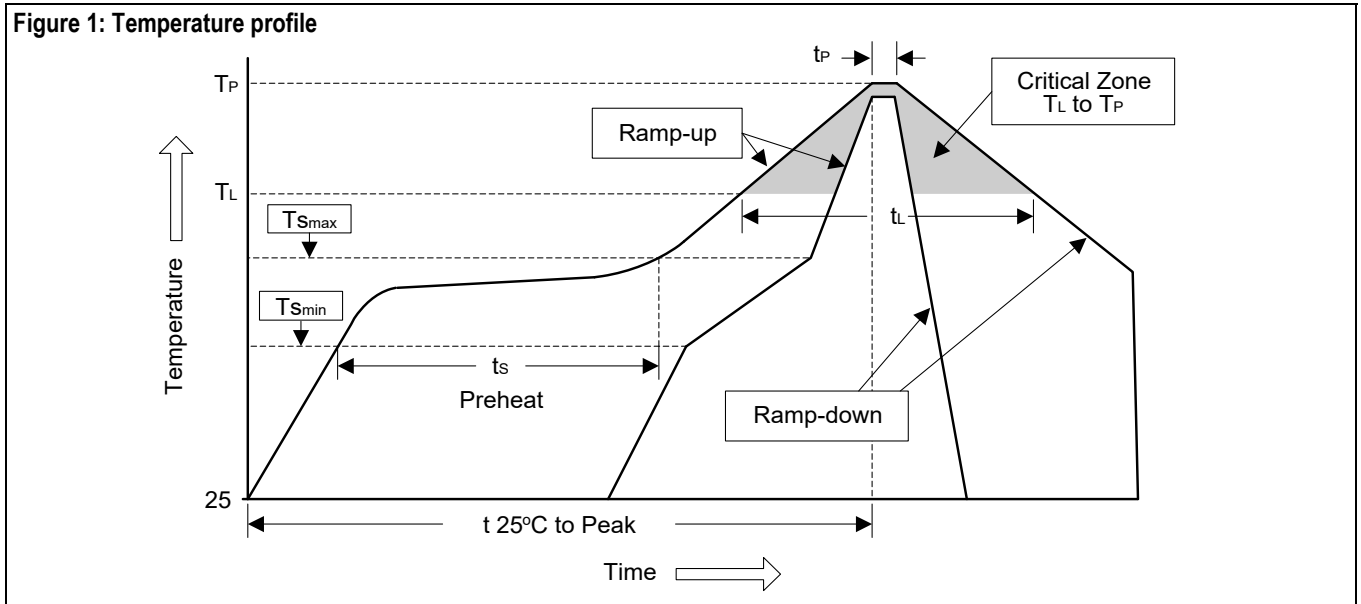


- Note 1: Land pattern (Footprint) design is for reference only.
- Note 2: Package body sizes exclude mold flash and burrs.
- Note 3: Dimension is measured in gauge plane.
- Note 4: Tolerance 0.1mm unless otherwise specified.

## 8. 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 (TL to TP)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T <sub>smmin</sub> )	100°C	150°C
- Temperature Max (T <sub>smmax</sub> )	150°C	200°C
- Time (min to max) (ts)	60 to 120 sec	60 to 180 sec
T <sub>smmax</sub> to TL		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (TL)	183°C	217°C
- Time (t <sub>L</sub> )	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

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

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