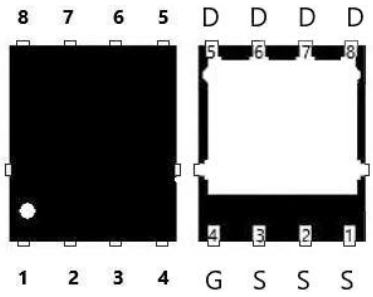
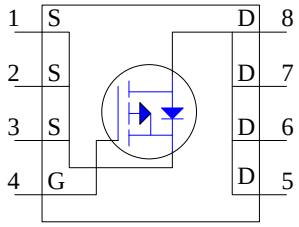
SG30P05Q

30V P-Channel Power MOSFET

Parameter	Value	Unit
V_{DSS}	-30	V
$R_{DS(ON)\ max.}$ V_{GS}=-10V	10.0	mΩ
$R_{DS(ON)\ max.}$ V_{GS}=-4.5V	14.8	mΩ
I_D	-32.7	A
Q_{g10v}	65.8	nC
Q_{gd}	9.3	nC
Q_{sw}	17.7	nC

PDFN 5x6-8L





Features

- Low On-Resistance
- Low Input Capacitance
- Low Miller Charge
- Low Input/Output Leakage
- Pb-free lead plating; RoHS compliant

Application

- Motor / Body Load Control
- Load Switch
- DC-DC converters and Off-line UPS

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SG30P05Q	Halogen-Free	PDFN5x6-8L	Q	Tape & Reel	2,500

Absolute Maximum Ratings (T_J=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous Note 1	T_C=25°C	I_D	-32.7	A
	T_C=100°C		-20.7	A
Drain Current-Continuous Note 2	T_A=25°C	I_D	-9.2	A
	T_A=70°C		-7.4	A
Drain Current-Pulsed Note 2	Tc=25°C	I_{DM}	-130	A
Avalanche Current		I_{AS}	-31.3	A
Single Pulse Avalanche Energy Note 3		E_{AS}	49.2	mJ
Maximum Power Dissipation	Tc=25°C	P_D	15.3	W
	Tc=100°C		6.1	W
	T_A=25°C		1.2	W
	T_A=70°C		0.8	W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to- Case Note 4	$R_{\theta JC}$	Steady State	-	-	8.0	°C/W
Maximum Junction-to- Ambient Note 4	$R_{\theta JA}$	Steady State	-	-	93.0	°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≦100uS, Duty≦2%)
4. Limited by T_{Jmax}, starting T_J=25°C, L=0.1mH, R_g=25Ω, I_D=-31.3A, V_{GS}=10V.
5. The The value of thermal resistance is measured with the single device mounted on 1 inch^2 FR-4 PCB with 2 oz. copper under a still air environment temperature is 25℃ 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	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V	-	-	-1	μA
		V_{DS}=-30V, V_{GS}=0V, T_J=125°C	-	-	-100	μA
Gate-Body Leakage	I_{GSS}	V_{GS}=±20V, 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	-1.0	-1.4	-1.8	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_{DS}=-20A	-	8.3	10.0	mΩ
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_{DS}=-10A	-	12.3	14.8	mΩ
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	2.6	-	Ω
Forward Transconductance	gfs	VDS=-5V, I_{DS}=-5A	-	14.3	-	S

DYNAMIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Capacitance	C_{iss}	V_{DS}=-30V, V_{GS}=0V, f=1MHz	-	3873.5	-	pF
Output Capacitance	C_{oss}	V_{DS}=-30V, V_{GS}=0V, f=1MHz	-	393.7	-	pF
Reverse Transfer Capacitance	C_{rss}	V_{DS}=-30V, V_{GS}=0V, f=1MHz	-	269.9	-	pF
Turn-On Delay Time	$T_{d(on)}$	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-20A, R_{GEN}=49.9Ω	-	50.2	-	nS
Rise Time	t_r	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-20A, R_{GEN}=49.9Ω	-	89.6	-	nS
Turn-Off Delay Time	$T_{d(off)}$	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-20A, R_{GEN}=49.9Ω	-	451.0	-	nS
Fall Time	t_f	V_{DS}=-15V, V_{GS}=-10V, I_{DS}=-20A, R_{GEN}=49.9Ω	-	195.5	-	nS

GATE CHARGE CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate to Source Gate Charge	Q_{gs}	V_{DD}=-15V, I_{DS}=-20A, V_{GS}=0 to -10V	-	14.1	-	nC
Gate charge at threshold	$Q_{g(th)}$	V_{DD}=-15V, I_{DS}=-20A, V_{GS}=0 to -10V	-	5.7	-	nC
Gate to Drain Charge	Q_{gd}	V_{DD}=-15V, I_{DS}=-20A, V_{GS}=0 to -10V	-	9.3	-	nC
Switching charge	Q_{SW}	V_{DD}=-15V, I_{DS}=-20A, V_{GS}=0 to -10V	-	17.7	-	nC
Gate charge total	Q_{g10v}	V_{DD}=-15V, I_{DS}=-20A, V_{GS}=0 to -10V	-	65.8	-	nC
	$Q_{g4.5v}$	V_{DD}=-15V, I_{DS}=-20A, V_{GS}=0 to -4.5V		30.4		nC
Gate plateau voltage	$V_{plateau}$	V_{DD}=-15V, I_{DS}=-20A, V_{GS}=0 to -10V	-	3.2	-	V
Gate charge total, sync. FET (Q_g- Q_{gd})	$Q_{g(sync)}$	V_{DS}=-0.1V, V_{GS}=0 to -10V	-	56.5	-	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	-	-	-35.9	A
Diode pulse current	I_{SM}	T_C=25°C	-	-	-130	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-20A	-	-0.9	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	V_{DD}=-15V, I_F=-20A, di/dt=100A/μs	-	14.7	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}	V_{DD}=-15V, I_F=-20A, di/dt=100A/μs	-	5.2	-	nC

Typical Operating Characteristics

Fig. 1: Output Characteristics

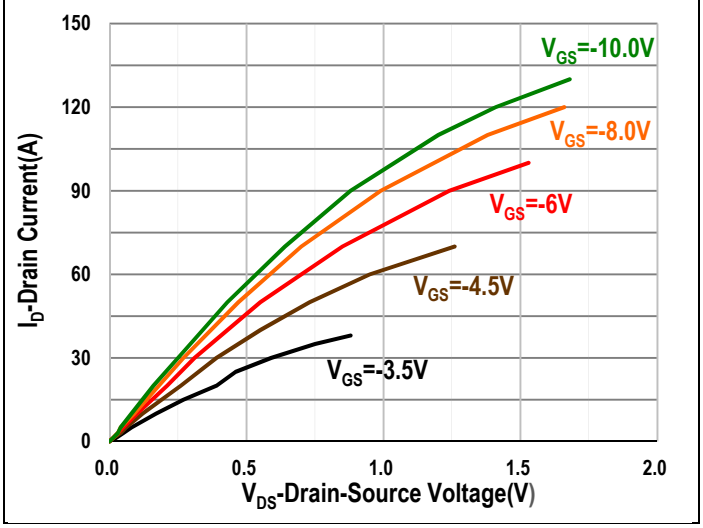


Fig. 2: Gate Threshold Voltage Vs. T_a

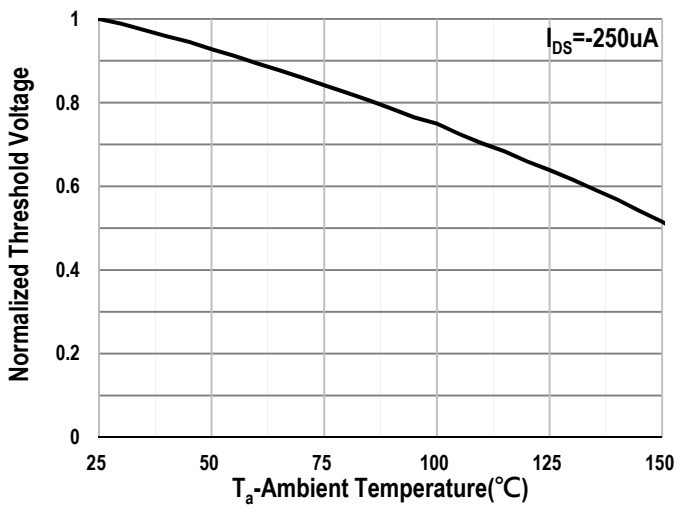


Fig. 3: Drain-Source On Resistance

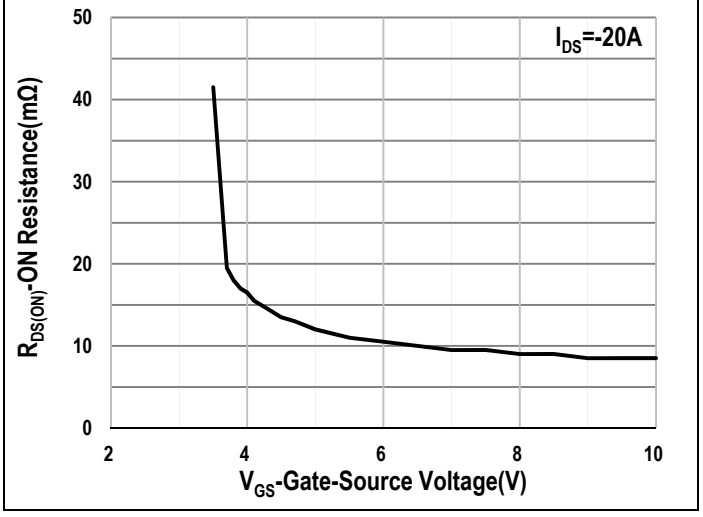


Fig. 4: Normalized On Resistance Vs. T_a

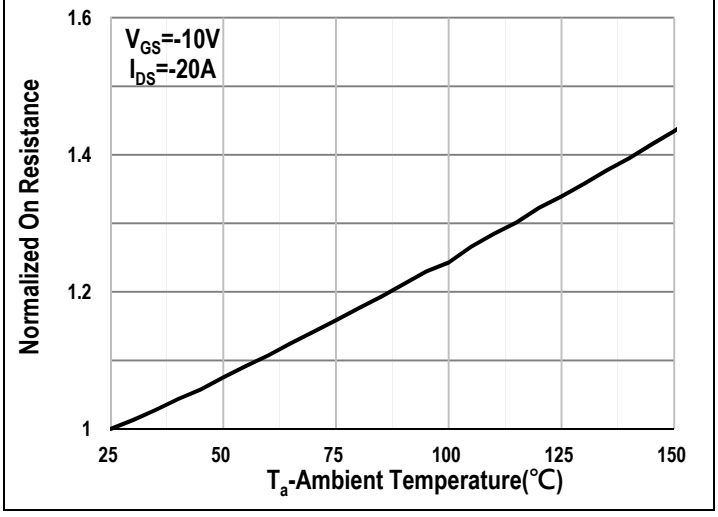


Fig. 5: Drain-Source On Resistance

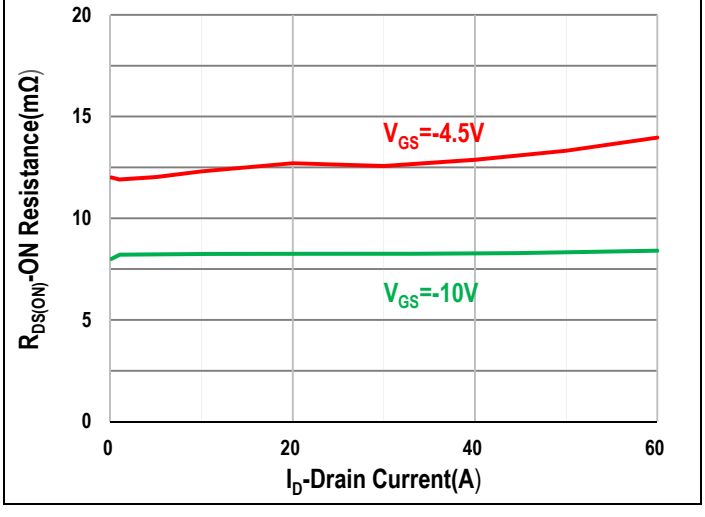
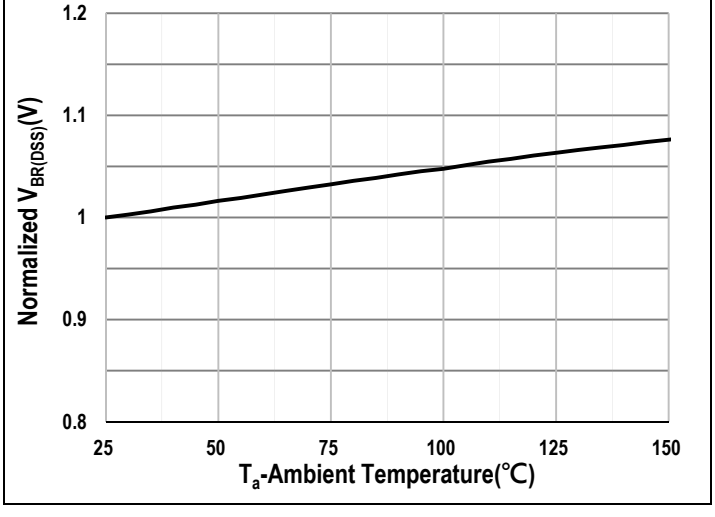


Fig. 6: Drain-source Breakdown Voltage



Typical Operating Characteristics (Cont.)

Fig. 7: Capacitance

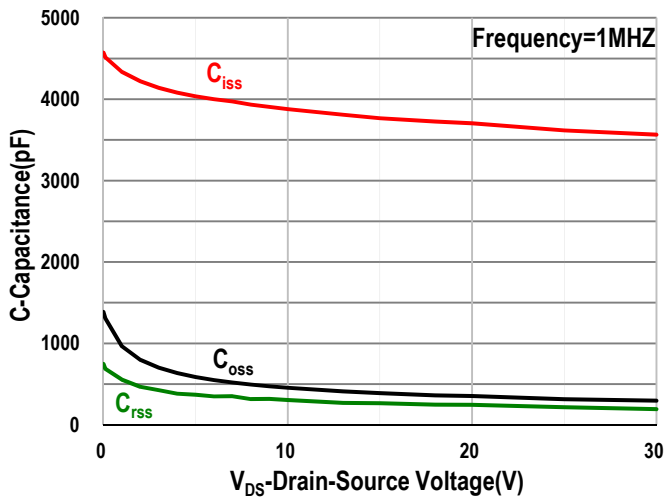


Fig. 8: Gate Charge

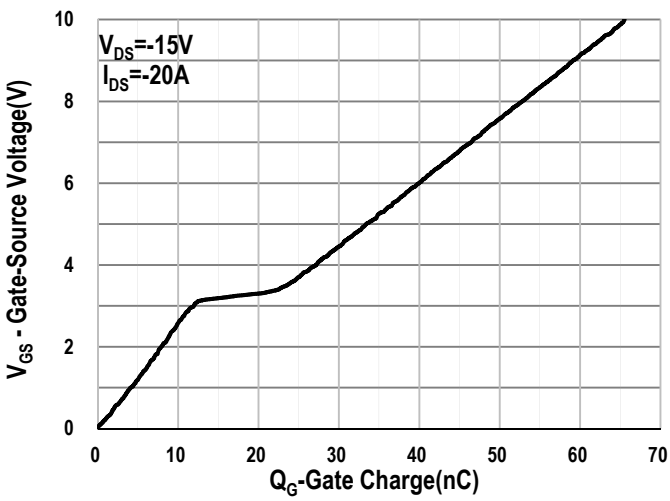


Fig. 9: Power Dissipation Vs. T_c

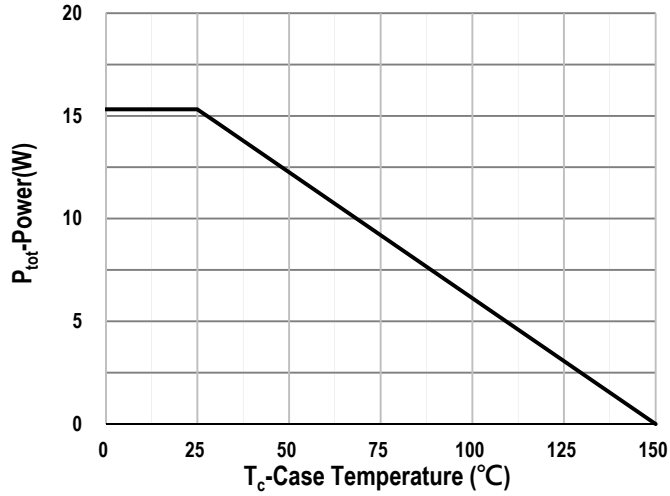


Fig. 10: Drain Current Vs. T_c

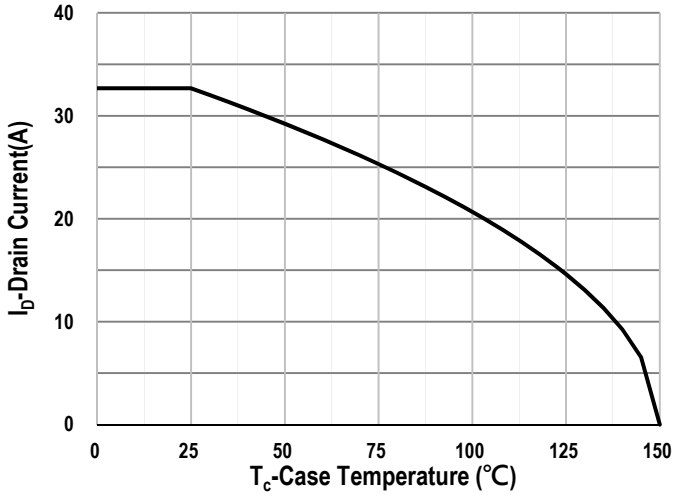


Fig. 11: Body Diode Forward Voltage Vs. I_S

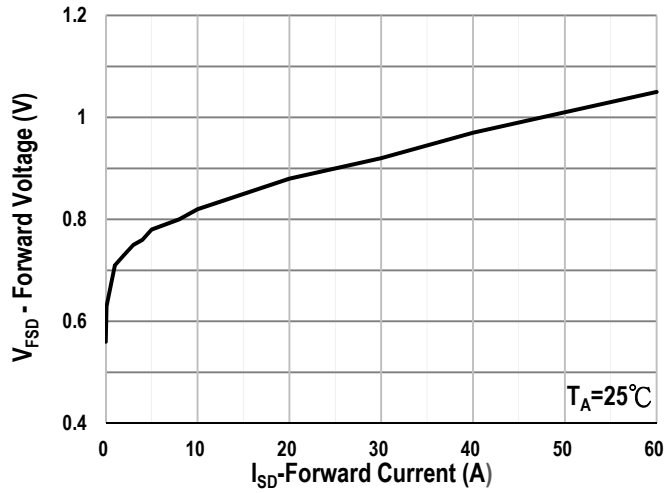


Fig. 12: Body Diode Forward Voltage Vs. T_A

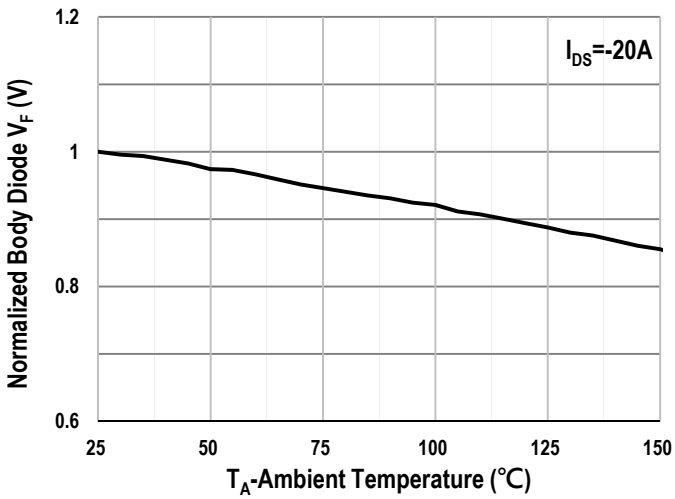


Fig. 13: Safe Operation Area

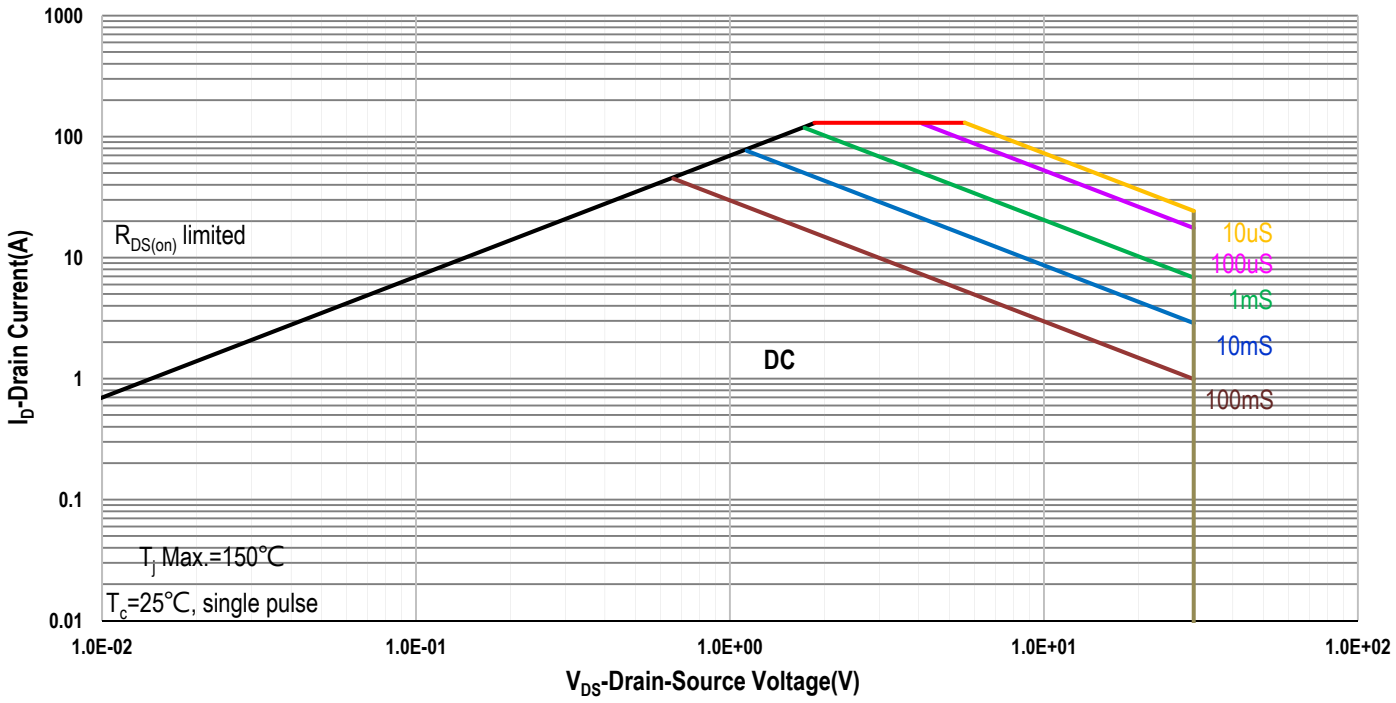
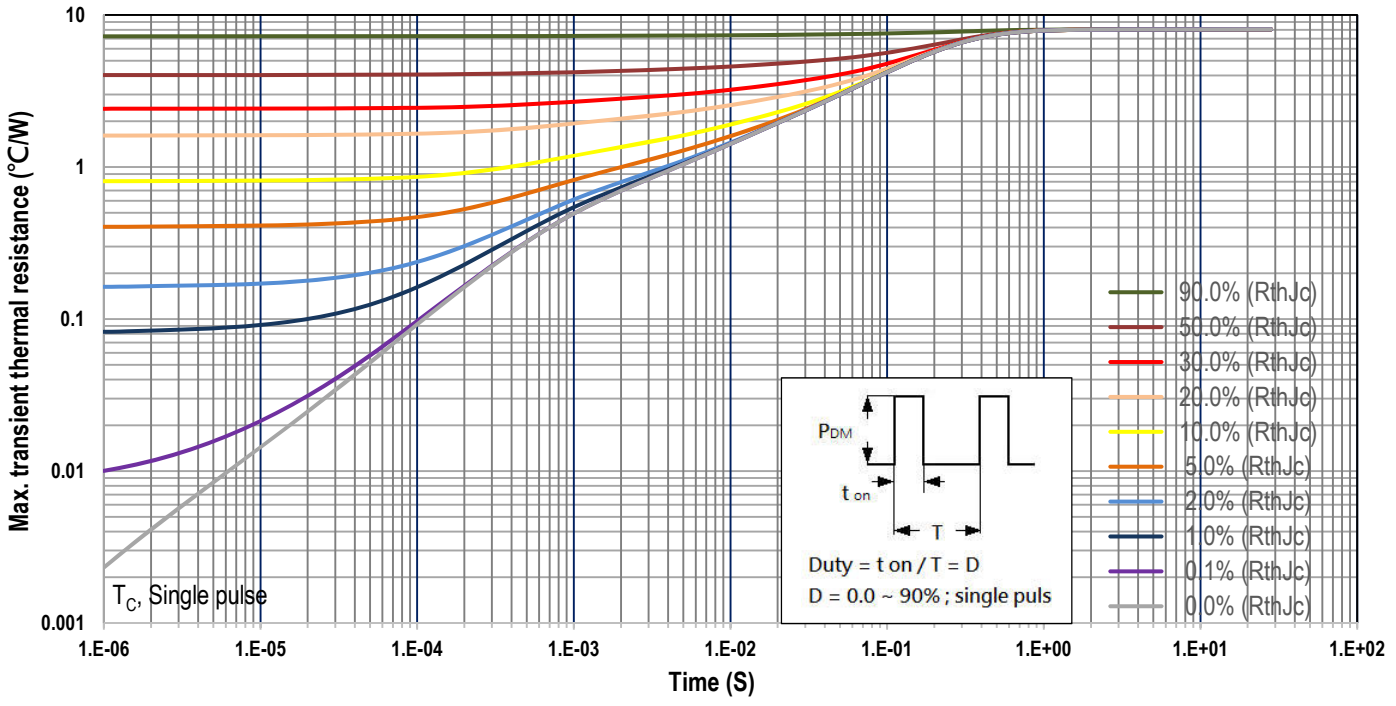


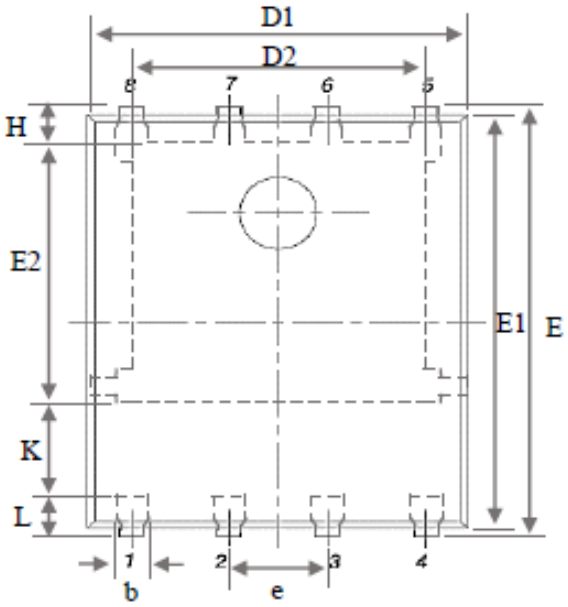
Fig. 14: Transient Thermal Impedance

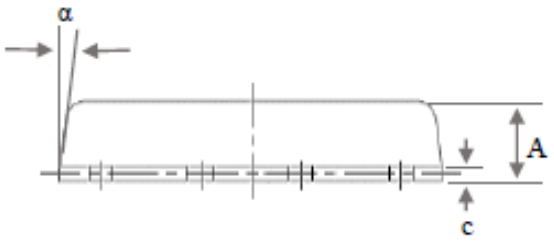


Marking Information

PDFN 5x6-8L (Q)	Marking Rule
Laser Marking  	Line 1：Device SG30P05Q Line 2：Date Code YYMMXXX YY：Year Code MM：Month Code XXX：Serial Number

Package of Dimension





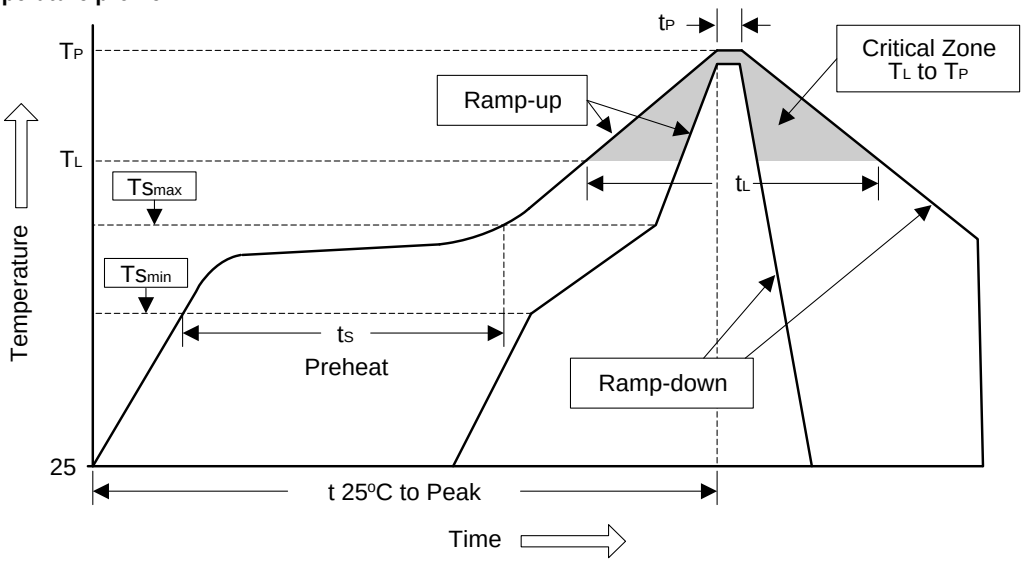
Symbol	Min	Nor	Max
A	0.90	1.04	1.17
b	0.33	0.42	0.51
C	0.06	0.20	0.35
D1	4.80	5.10	5.40
D2	3.61	3.96	4.31
E	5.90	6.03	6.15
E1	5.65	5.75	5.85
E2	3.30	3.54	3.78
e	1.27 BSC		
H	0.38	0.50	0.61
L	0.38	0.55	0.71
L1	0.05	0.15	0.25

1. All dimension are in millimeters.
2. Dimension does not include burrs and mold flash/protrusions.

Soldering Methods for Silicongear's Products

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 (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60 to 120 sec	 150°C 200°C 60 to 180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60 to 150 sec	 217°C 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

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