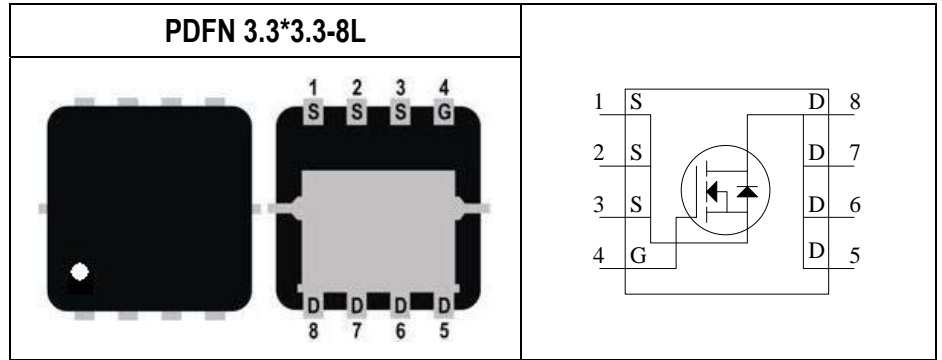


Parameter	Value	Unit
V_{DSS}	30	V
$R_{DS(ON) max. V_{GS}=10V}$	4.0	m Ω
$R_{DS(ON) max. V_{GS}=4.5V}$	4.5	m Ω
$R_{DS(ON) max. V_{GS}=2.5V}$	5.8	m Ω
I_D	64.7	A
Q_g	69.5	nC
Q_{gd}	8.6	nC
Q_{SW}	60.9	nC



Features	Application
<ul style="list-style-type: none"> Low On-Resistance $R_{DS(on)}$ Low Input Capacitance Low Gate Charge Fully Characterized Capacitance and Avalanche Pb-free lead plating ; RoHS compliant 	<ul style="list-style-type: none"> Laptop and PCs DC-DC Converter AC-DC Adaptor With Logic Level Driving Lithium-Ion Secondary Batteries

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SG30N10E	Halogen-Free	PDFN3.3*3.3-8L	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}	30	V
Gate-Source Voltage	V_{GS}	± 10	V
Drain Current-Continuous ^{Note 1}	$T_C=25^\circ\text{C}$	64.7	A
	$T_C=100^\circ\text{C}$	44.8	A
Drain Current-Continuous ^{Note 2}	$T_A=25^\circ\text{C}$	22.7	A
	$T_A=70^\circ\text{C}$	16.9	A
Drain Current-Pulsed ^{Note 3}	$T_C=25^\circ\text{C}$	120	A
Avalanche Current	I_{AR}	33	A
Single Pulse Avalanche Energy ^{Note 4}	E_{AS}	54.4	mJ
Maximum Power Dissipation	$T_C=25^\circ\text{C}$	25	W
	$T_C=100^\circ\text{C}$	10	W
	$T_A=25^\circ\text{C}$	3	W
	$T_A=70^\circ\text{C}$	1.9	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	-	-	5	$^\circ\text{C/W}$
Thermal resistance, Junction-Ambient ^{Note 5}	$R_{\theta JA}$	Steady State	-	-	40.69	$^\circ\text{C/W}$

Notes:

- Limited by silicon chip capability and junction-to-case thermal resistance.
- The maximum current rating is limited by package and junction-to-ambient thermal resistance.
- Must be ensure junction temperature does not exceed 150-degree C. (Pulse Width \leq 100uS, Duty \leq 2%)
- Limited by T_{Jmax} , starting $T_J=25^\circ\text{C}$, $L=0.1\text{mH}$, $R_g=25\Omega$, $I_D=33\text{A}$, $V_{GS}=10\text{V}$.
- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 in still air.

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

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_{DS}=250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
		$V_{DS}=30V, V_{GS}=0V, T_J=125^\circ C$	-	-	100	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	± 100	nA

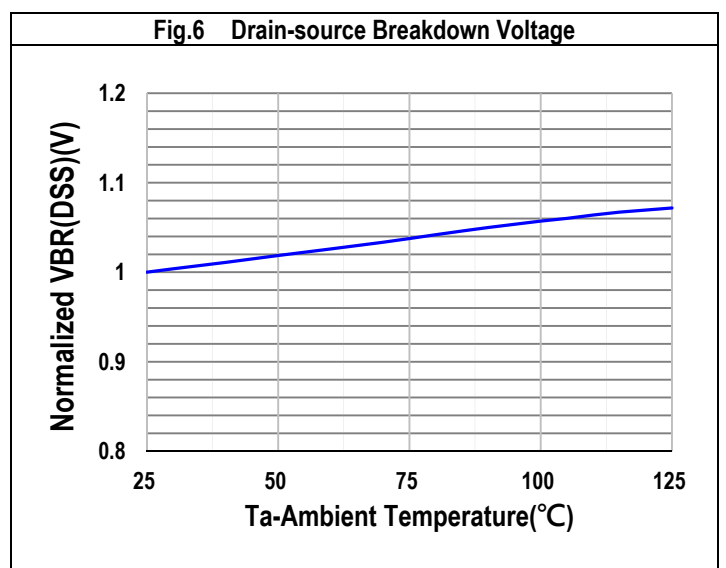
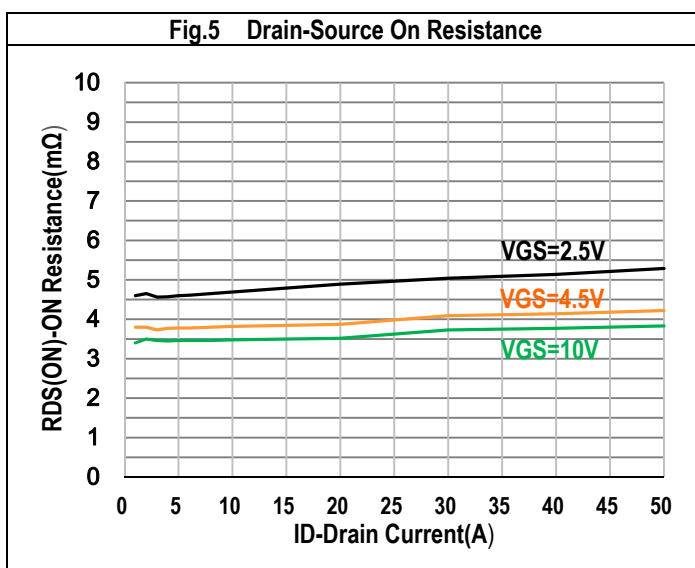
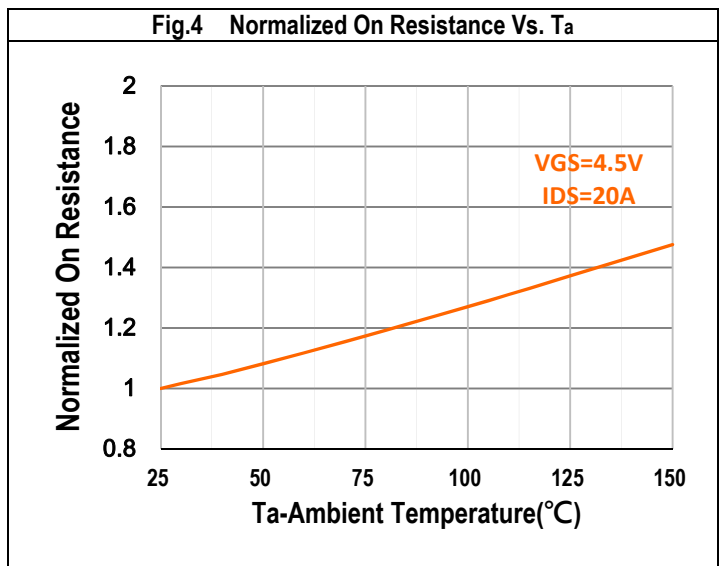
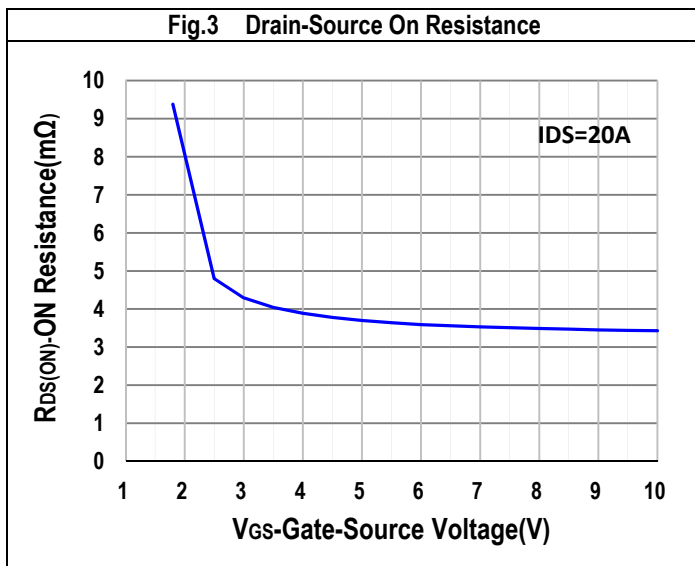
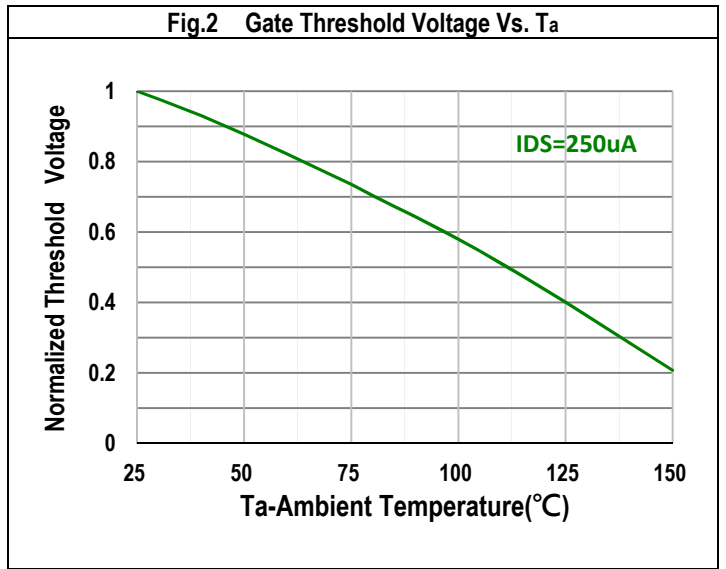
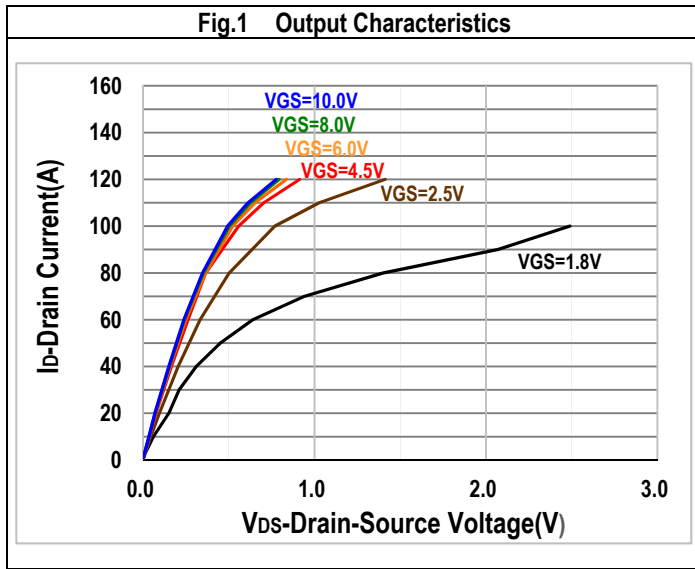
STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	0.4	0.7	1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_{DS}=16A$	-	3.4	4.0	m Ω
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_{DS}=16A$	-	3.8	4.5	m Ω
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=2.5V, I_{DS}=8A$	-	4.7	5.8	m Ω
Gate Resistance	R_g	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	-	0.9	-	Ω
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_{DS}=10A$	-	15	-	S

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V, f=1MHz$	-	2950	-	pF
Output Capacitance	C_{oss}	$V_{DS}=30V, V_{GS}=0V, f=1MHz$	-	298	-	pF
Reverse Transfer Capacitance	C_{rss}	$V_{DS}=30V, V_{GS}=0V, f=1MHz$	-	176	-	pF
Turn-On Delay Time	$T_{d(on)}$	$V_{DS}=15V, V_{GS}=10V, I_{DS}=10A, R_{GEN}=3\Omega$	-	11.7	-	nS
Rise Time	t_r	$V_{DS}=15V, V_{GS}=10V, I_{DS}=10A, R_{GEN}=3\Omega$	-	11.6	-	nS
Turn-Off Delay Time	$T_{d(off)}$	$V_{DS}=15V, V_{GS}=10V, I_{DS}=10A, R_{GEN}=3\Omega$	-	58.7	-	nS
Fall Time	t_f	$V_{DS}=15V, V_{GS}=10V, I_{DS}=10A, R_{GEN}=3\Omega$	-	9.3	-	nS

GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q_{gs}	$V_{DD}=30V, I_D=20A, V_{GS}=0$ to 10V	-	8.2	-	nC
Gate charge at threshold	$Q_{g(th)}$	$V_{DD}=30V, I_D=20A, V_{GS}=0$ to 10V	-	2.3	-	nC
Gate to Drain Charge	Q_{gd}	$V_{DD}=30V, I_D=20A, V_{GS}=0$ to 10V	-	8.6	-	nC
Switching charge	Q_{SW}	$V_{DD}=30V, I_D=20A, V_{GS}=0$ to 10V	-	14.5	-	nC
Gate charge total	$Q_{g 10V}$	$V_{DD}=30V, I_D=20A, V_{GS}=0$ to 10V	-	69.5	-	nC
Gate charge total	$Q_{g 4.5V}$	$V_{DD}=30V, I_D=20A, V_{GS}=0$ to 4.5V	-	33.2	-	nC
Gate plateau voltage	$V_{plateau}$	$V_{DD}=30V, I_D=20A, V_{GS}=0$ to 10V	-	2.2	-	V
Gate charge total, sync. FET ($Q_g - Q_{gd}$)	$Q_{g(sync)}$	$V_{DS}=0.1V, V_{GS}=0$ to 10V	-	60.9	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Body Diode continuous forward current	I_S	$T_C=25^\circ C$	-	-	64.7	A
Body Diode pulse current	I_{SM}	$T_C=25^\circ C$	-	-	120	A
Body Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1A$	-	0.6	1.0	V
Body Diode Reverse Recovery Time	t_{rr}	$V_{DD}=24V, I_F=10A, di/dt=100A/\mu s$	-	27	-	nS
		$V_{DD}=24V, I_F=10A, di/dt=200A/\mu s$	-	26.9	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}	$V_{DD}=24V, I_F=10A, di/dt=100A/\mu s$	-	9.7	-	nC
		$V_{DD}=24V, I_F=10A, di/dt=200A/\mu s$	-	25.1	-	nC

Typical Operating Characteristics



Typical Operating Characteristics (Cont.)

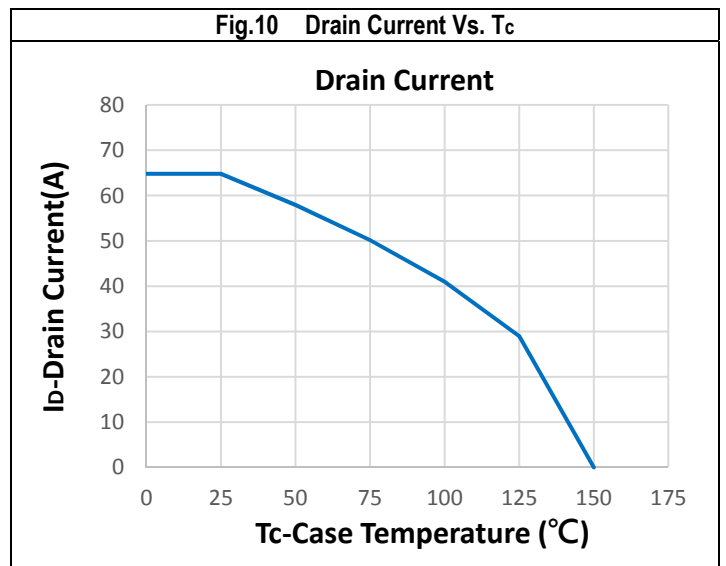
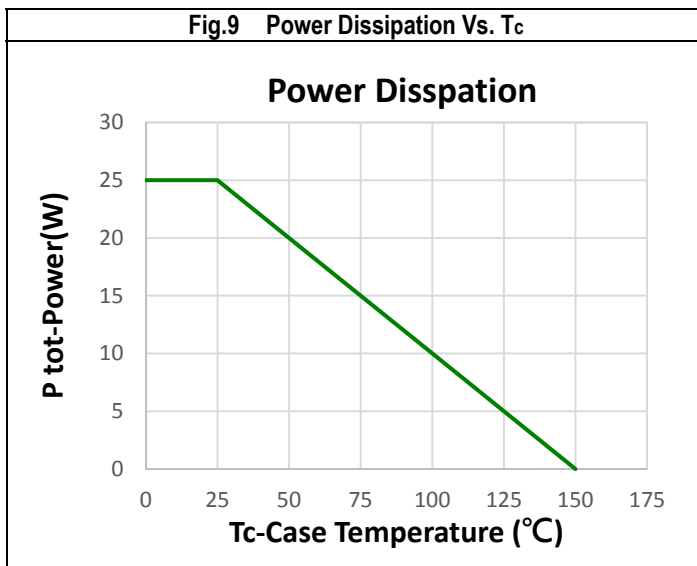
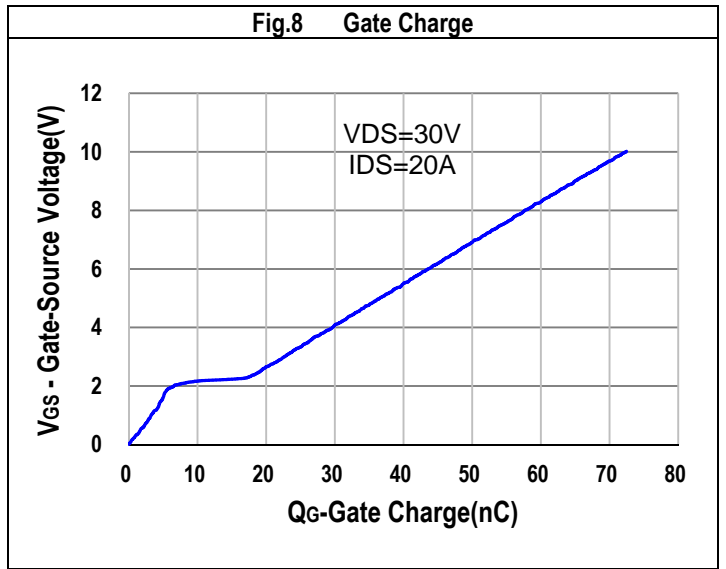
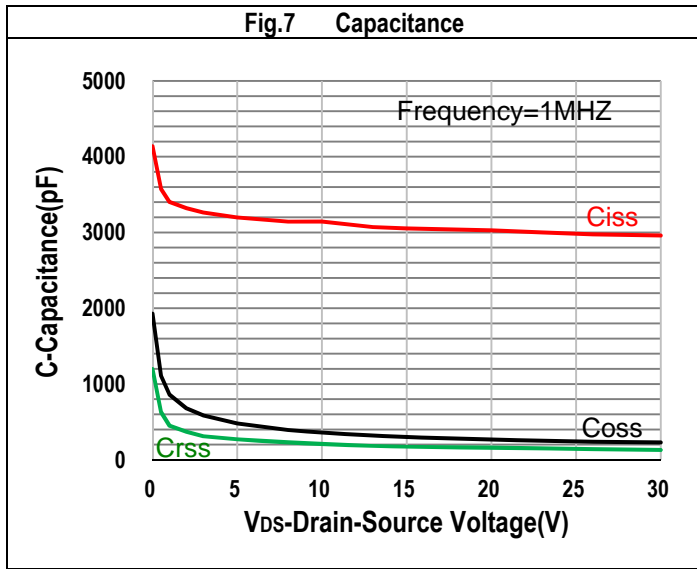


Fig.11 Safe Operation Area

Safe Operating Area

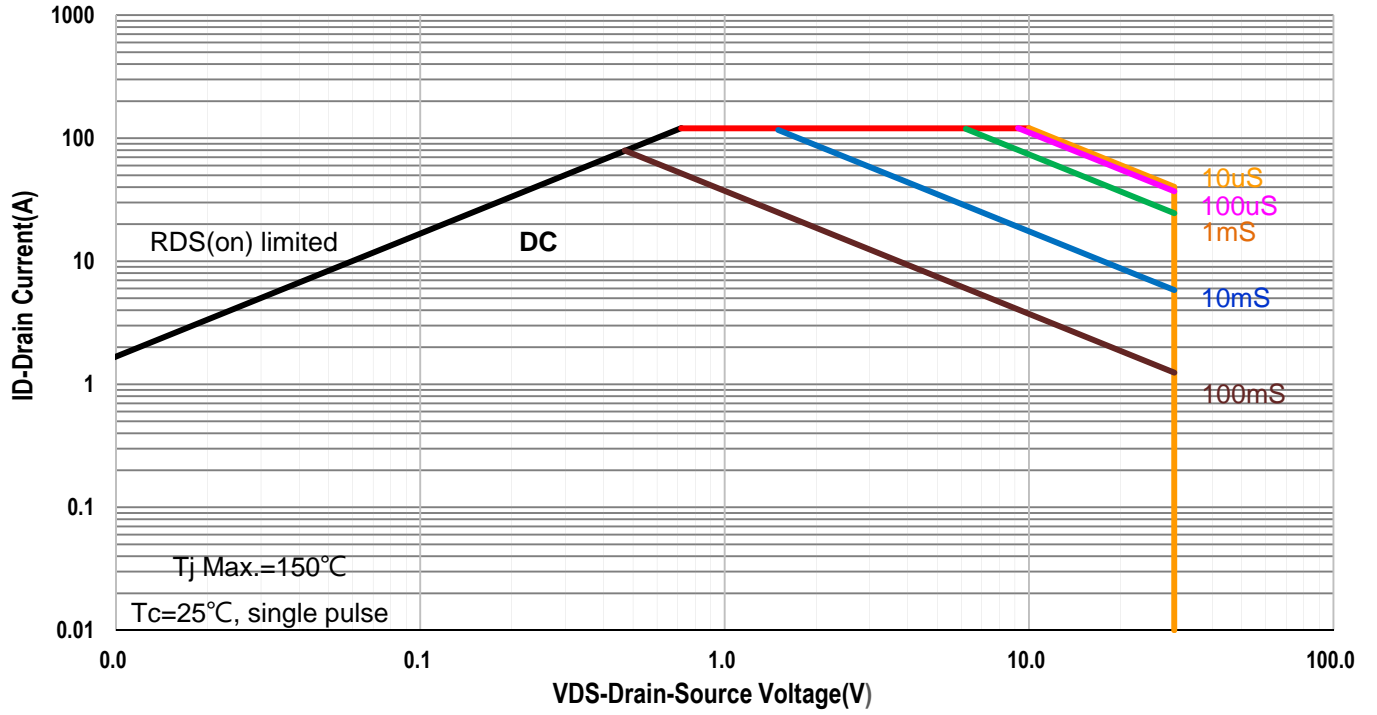
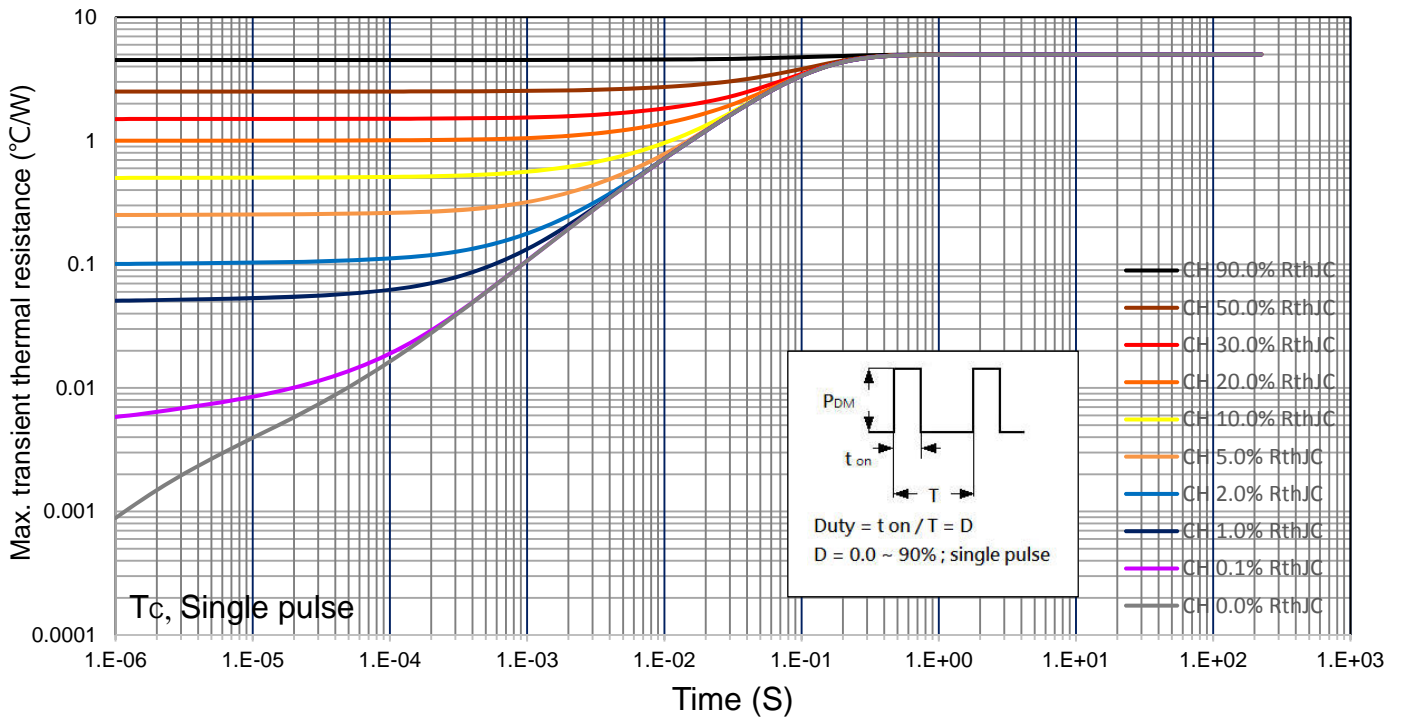



Fig.12 Transient Thermal Impedance



Marking Information

PDFN 3.3*3.3-8L (E)	Marking Rule
<p data-bbox="124 365 293 398">Laser Marking</p>  <p data-bbox="400 824 504 857">Diagram</p>	<p data-bbox="807 365 1070 398"><u>Line 1</u> : Device Name</p> <p data-bbox="807 409 903 443">30N10E</p> <p data-bbox="807 454 1038 488"><u>Line 2</u> : Date Code</p> <p data-bbox="807 499 922 533">YMMXXX</p> <p data-bbox="807 589 983 622">Y : Year Code</p> <p data-bbox="807 633 1027 667">MM : Month Code</p> <p data-bbox="807 678 1062 712">XXX : Serial Number</p> <p data-bbox="807 768 1190 801">Year Code Description As Below</p>

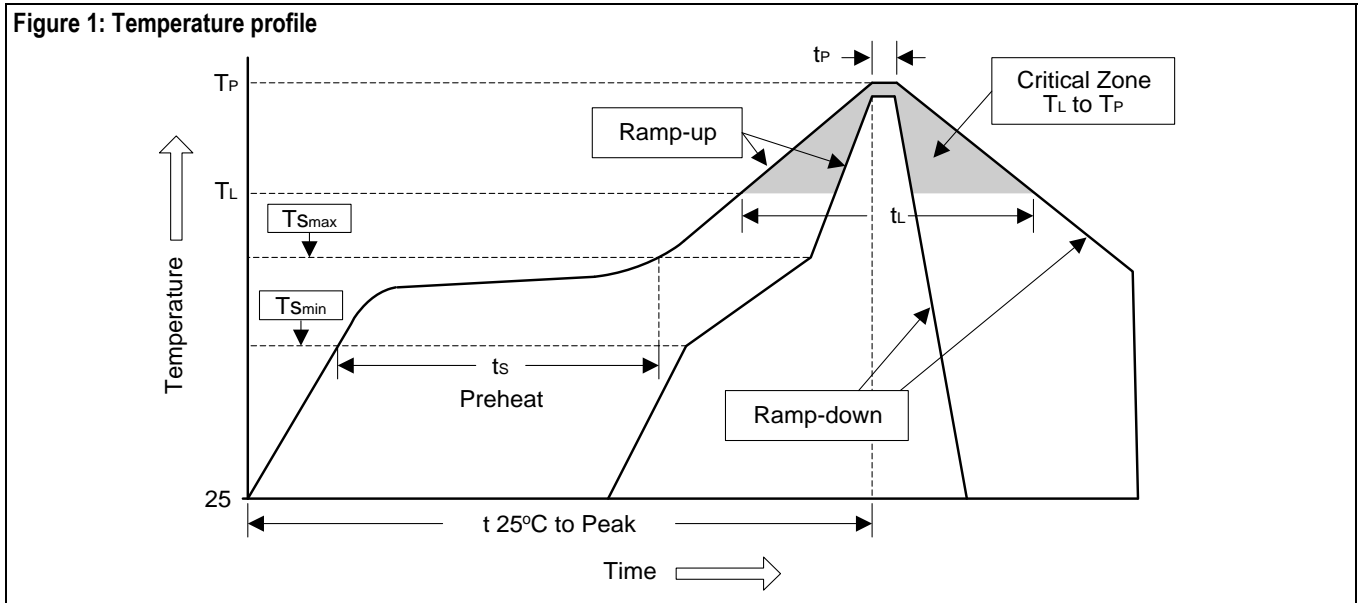
Year Code Description

Year Code	Year	
0	2010	2020
1	2011	2021
2	2012	2022
3	2013	2023
4	2014	2024
5	2015	2025
6	2016	2026
7	2017	2027
8	2018	2028
9	2019	2029

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 (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

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