Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60V	10.5mΩ@10V	12A
	14mΩ@4.5V	

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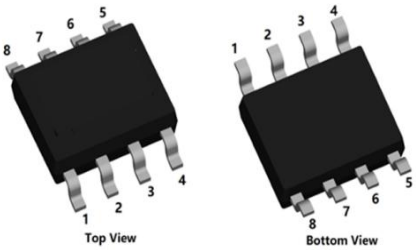
Feature

- Fast Switching
- Advanced Split Gate Trench Technology
- ***100% UIS TESTED***

Application

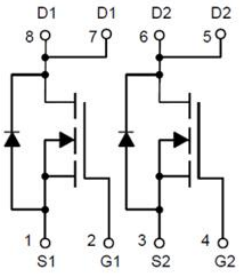
- Power Management
- Switched mode power supply

Package

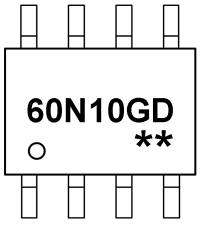


SOP-8L

Circuit Diagram



Marking



60N10GD :Device Code
**** :Week Code**

Order Information

Device	Package	Unit/Tape
SP60N10GDP8	SOP-8L	4000

Absolute maximum ratings (Ta=25℃, unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	60	V
Gate-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current (Ta=25℃)	I_D	12	A
Continuous Drain Current (Ta=100℃)	I_D	8	A
Pulse Drain Current Tested	I_{DM}	48	A
Single Pulse Avalanche Energy[1]	E_{AS}	100	mJ
Power Dissipation (Ta=25℃)	P_D	2	W
Power Dissipation (Ta=100℃)	P_D	0.8	W
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	62.5	℃/W
Storage Temperature Range	T_J	-55 to 150	℃
Operating Junction Temperature Range	T_{STG}	-55 to 150	℃

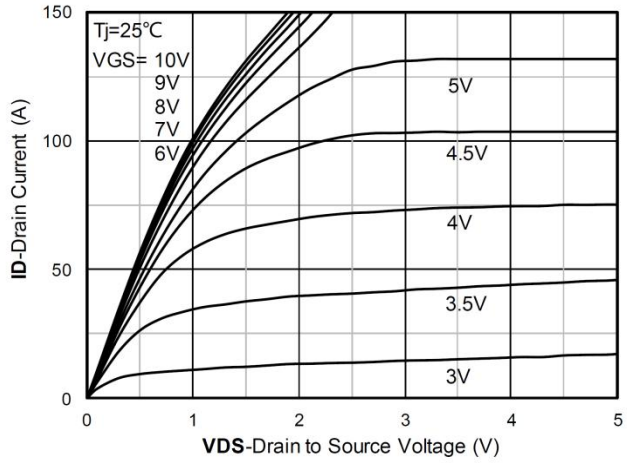
Electrical characteristics (Ta=25℃, unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	VGS=0V , ID=250uA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	VDS=48V , VGS=0V	-	-	1	uA
Gate Leakage Current	I_{GSS}	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	VDS=VGS , ID=250uA	1.0	1.6	2.5	V
Drain-Source On-state Resistance	$R_{DS(ON)}$	VGS=10V , ID=6A	-	10.5	14	mΩ
		VGS=4.5V , ID=4A	-	14	19	
Gate Resistance	R_G	f=1MHz	-	2.2	-	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	VGS=0V , VDS=30V , f=1MHz	-	910	-	pF
Output Capacitance	C_{oss}		-	220	-	
Reverse Transfer Capacitance	C_{rss}		-	10	-	
Total Gate Charge	Q_g	VDS=30V , VGS=10V , ID=10A	-	13	-	nC
Gate-Source Charge	Q_{gs}		-	2.5	-	
Gate-Drain Charge	Q_{gd}		-	3.2	-	
Gate Plateau Voltage	$V_{plateau}$		-	3	-	V
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	VDD=30V , ID=10A , VGS=10V , RG=4.7Ω	-	14	-	nS
Rise Time	t_r		-	26	-	
Turn-Off Delay Time	$t_{d(off)}$		-	33.8	-	
Fall Time	t_f		-	26.4	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I_S		-	-	12	A
Reverse Recovery Time	Trr	IS=10A , di/dt=100A/μs , TJ=25℃	-	36	-	nS
Reverse Recovery Charge	Qrr		-	23	-	nC

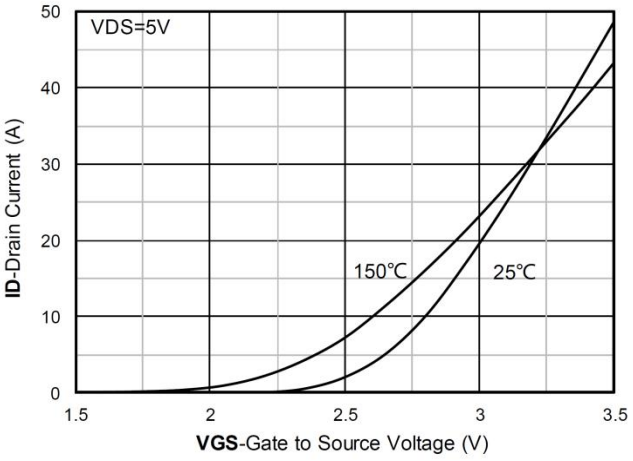
Note :

1. The test condition is VDD=30V, VGS=10V, L=0.5mH, RG=25Ω;

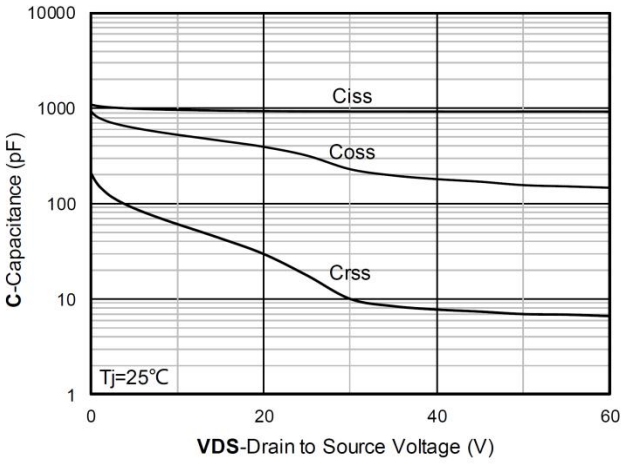
Typical Characteristics



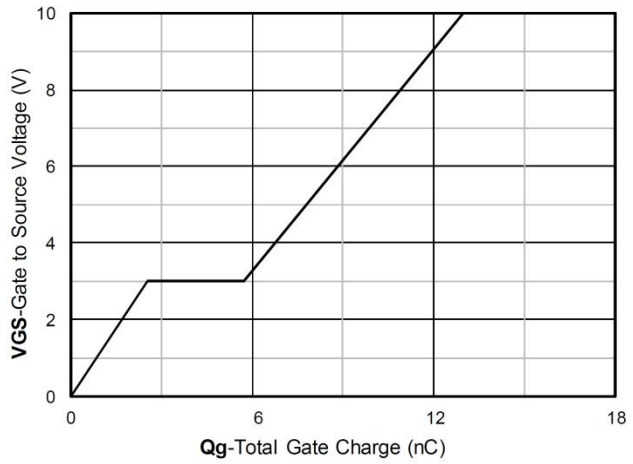
Output Characteristics



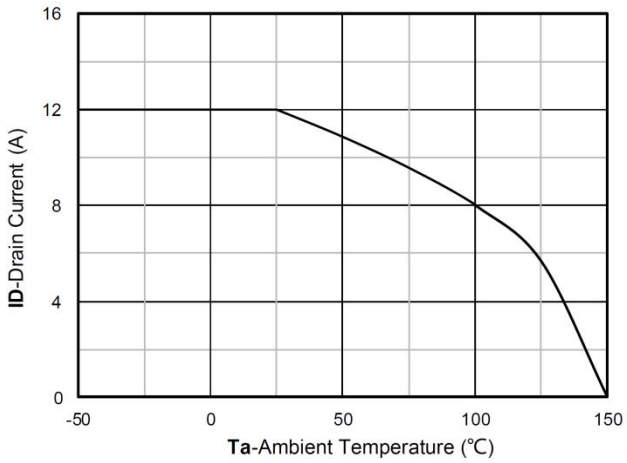
Transfer Characteristics



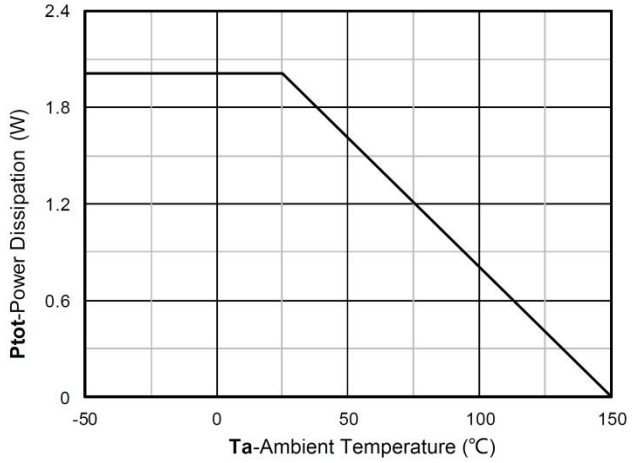
Capacitance Characteristics



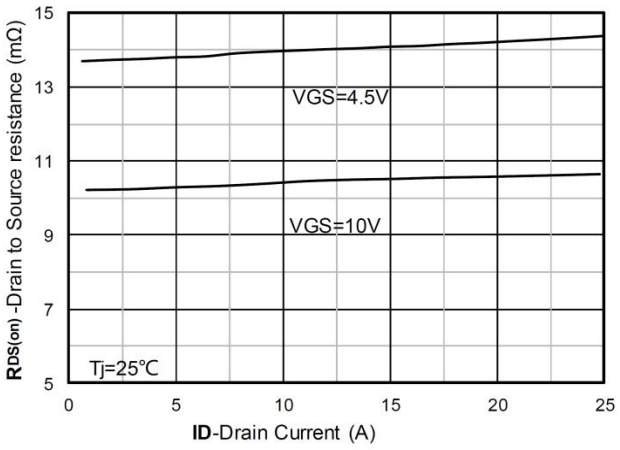
Gate Charge



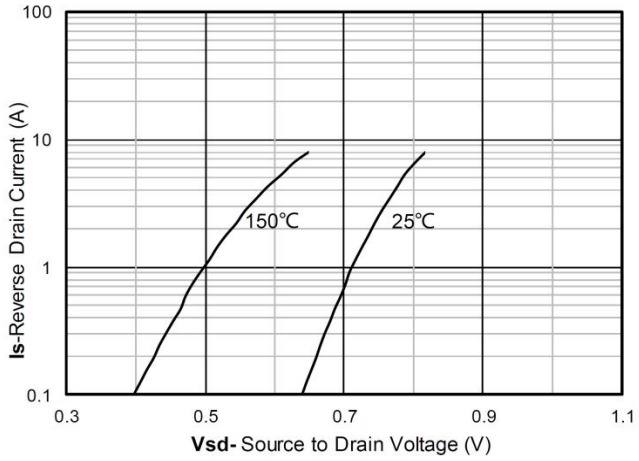
Current dissipation



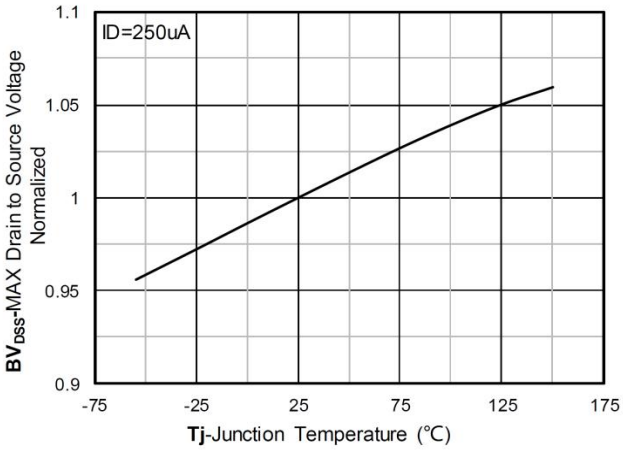
Power dissipation



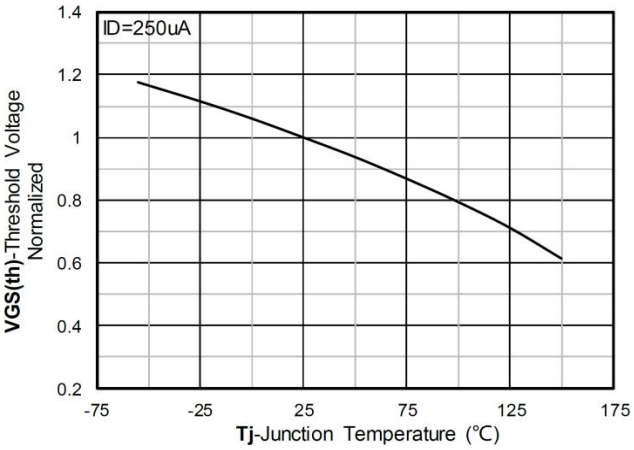
RDS(on) VS Drain Current



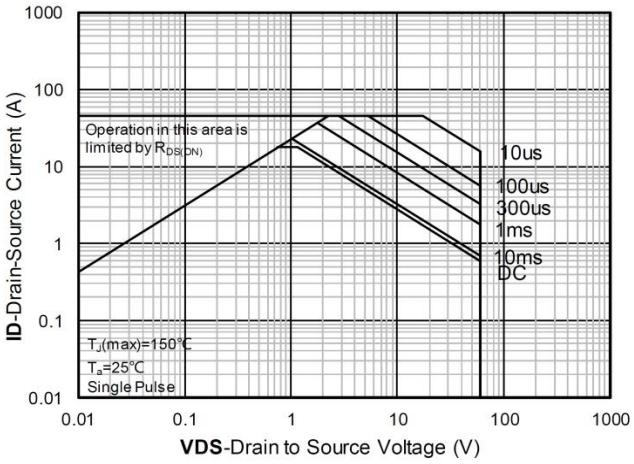
Forward characteristics of reverse diode



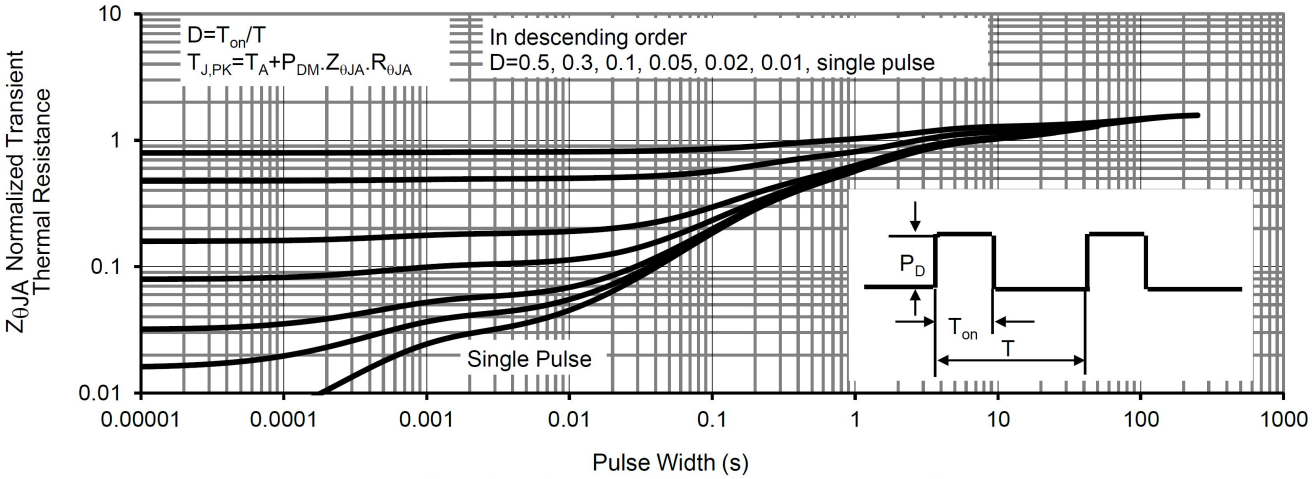
Normalized breakdown voltage



Normalized Threshold voltage



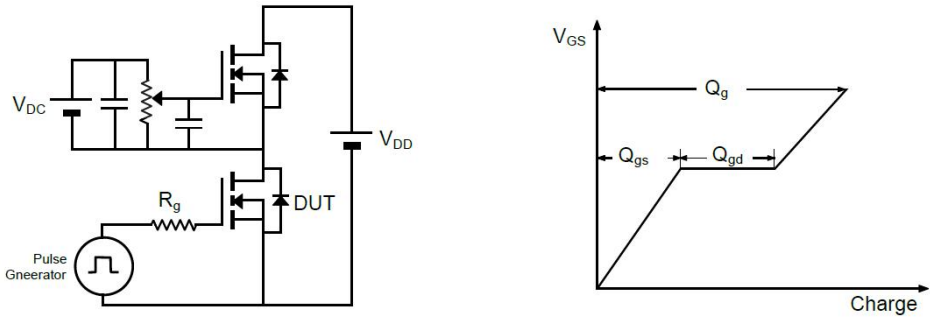
Safe Operation Area



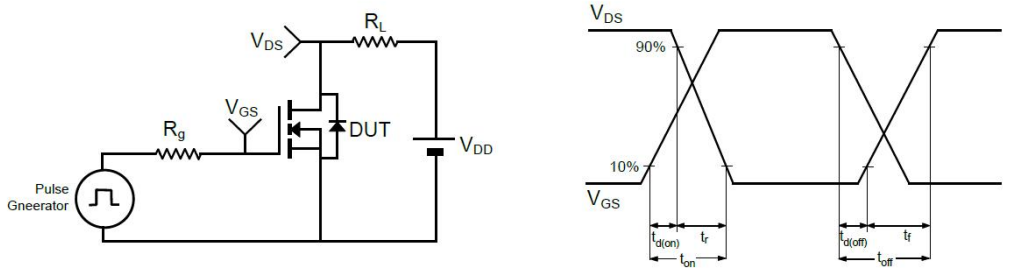
Normalized Maximum Transient Thermal Impedance

Test Circuit

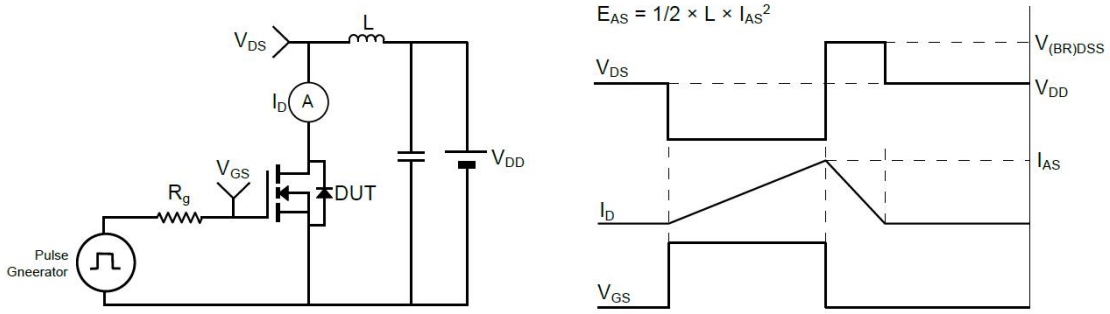
Gate Charge



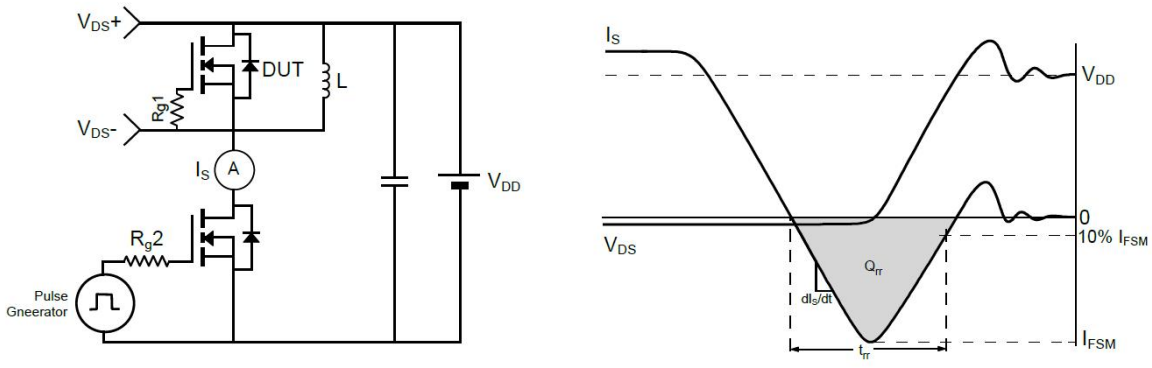
Resistive Load Switching Time



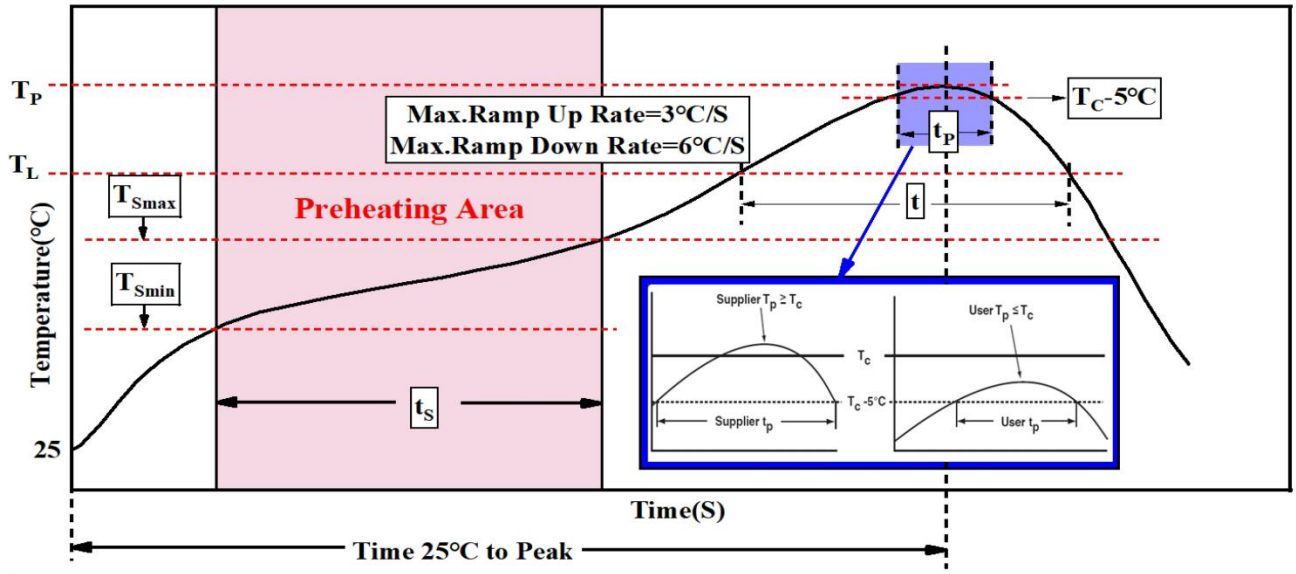
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (Tsmin) Temperature max (Tsmax) Time (Tsmin to Tsmax) (ts)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-120 seconds
Average ramp-up rate (Tsmax to Tp)	3 °C/second max.	3°C/second max.
Liquidous temperature (TL) Time at liquidous (tL)	183 °C 60-150 seconds	217°C 60-150 seconds
Peak package body Temperature e (Tp)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (tp)** within 5°C of the specified classification temperature (Tc)	20** seconds	30** seconds
Average ramp-down rate (Tp to Tsmax)	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature (Tp) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum		

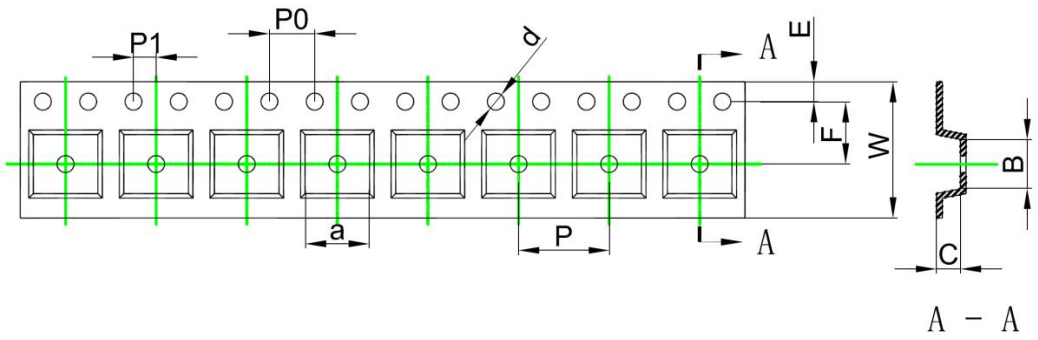
Table 1. SnPb Eutectic Process – Classification Temperatures (Tc)

Package Thickness	Volume mm^3 <350	Volume mm^3 ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2. Pb-free Process – Classification Temperatures (Tc)

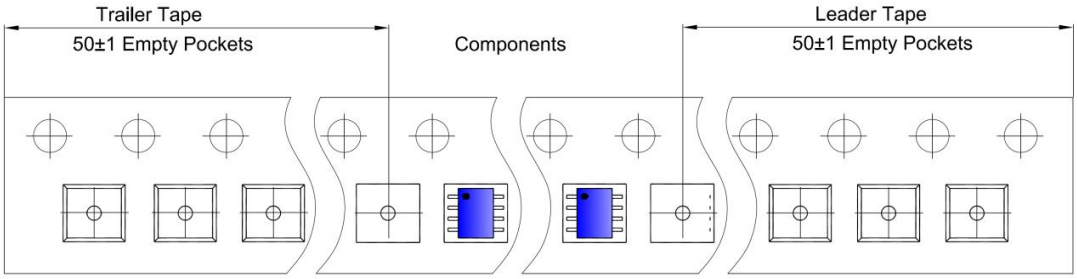
Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

SOP8 Embossed Carrier Tape

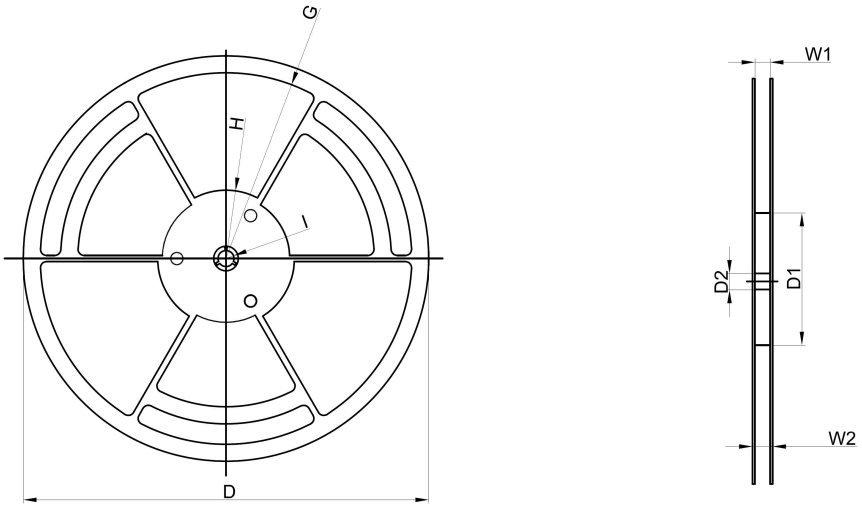


Dimensions are in millimeter										
Pkg type	a	B	c	d	E	F	P0	P	P1	W
SOP-8	6.40	5.40	2.10	Φ1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOP8 Tape Leader and Trailer



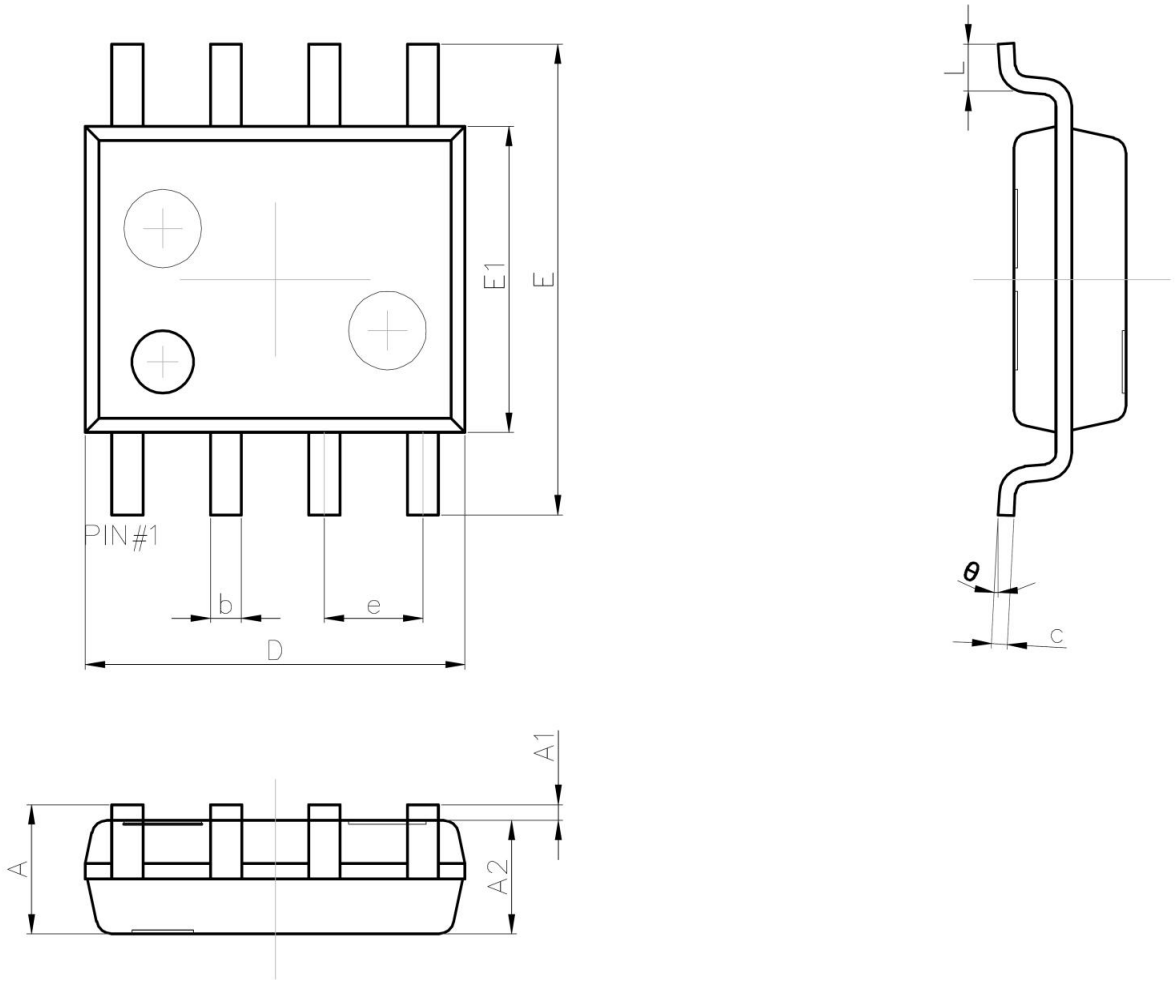
SOP8 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13"Dia	Ø330.00	100.00	13.00	R151.00	R56.00	R6.50	12.40	17.60

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
4,000 pcs	13 inch	8,000 pcs	360×360×65	40,000 pcs	565×380×390	

SOP-8L Package Information



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	1.35	1.75
A1	0.10	0.25
A2	1.35	1.55
b	0.33	0.51
c	0.17	0.25
D	4.80	5.00
e	1.27 REF.	
E	5.80	6.20
E1	3.80	4.00
L	0.40	1.27
θ	0°	8°