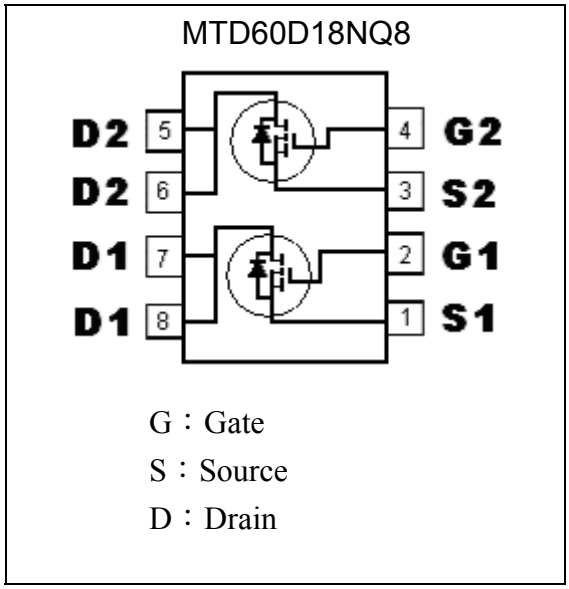
Dual N-Channel Enhancement Mode Power MOSFET

Features

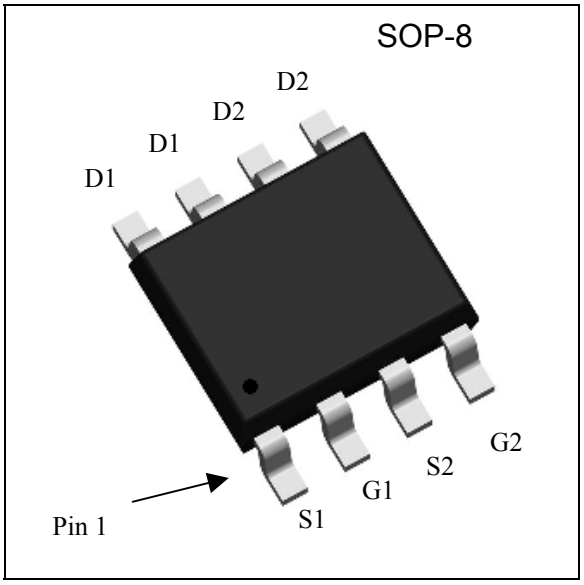
- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Dual N-ch MOSFET package
- Pb-free lead plating & Halogen-free package

BV_{DSS}	**60V**
I_D@V_{GS}=10V, T_C=25˚C	**18A**
R_{DSON}@V_{GS}=10V, I_D=6A	**12.5mΩ(typ)**

Equivalent Circuit



Outline



Ordering Information

Device	Package	Shipping
MTD60D18NQ8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T3 : 2500 pcs / tape & reel, 13” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C	I_D	18	A
Continuous Drain Current @ V_{GS}=10V, T_C=100°C		10	
Pulsed Drain Current	I_{DM}	80 (Note 1)	
Single Pulse Avalanche Current @ L=0.1mH	I_{AS}	35	
Single Pulse Avalanche Energy@L=1mH, I_{AS}=7A, V_{DD}=15V	E_{AS}	58 (Note 4)	mJ
Power Dissipation for Dual Operation		15.2	W
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	10	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	22	

Note : 1. Pulse width limited by maximum junction temperature
2. Surface mounted on 1 in² copper pad of FR-4 board, pulse width≤10s.
3. Surface mounted on minimum copper pad, pulse width≤10s.
4. 100% tested by conditions of L=0.1mH, V_{DD}=15V, V_{GS}=10V, I_{AS}=10A

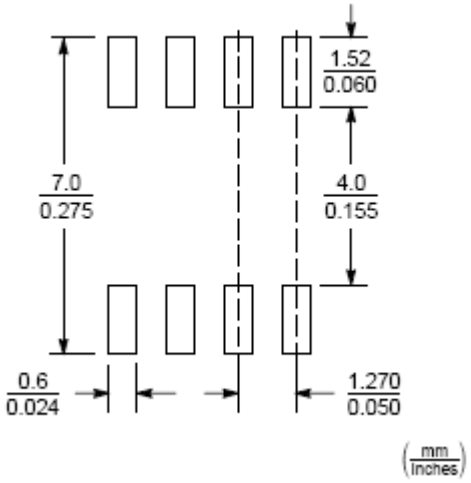
Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	60	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1.0	1.5	2.0		V_{DS} =V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS} =32V, V_{GS} =0V
	-	-	5		V_{DS} =40V, V_{GS} =0V, Tj=55°C
$R_{DS(ON)}$ *1	-	12.5	15	mΩ	V_{GS} =10V, I_D=6A
Dynamic					
Qg *1, 2	-	27	-	nC	V_{DS}=20V, I_D=10A, V_{GS}=10V
Qgs *1, 2	-	4.5	-		
Qgd *1, 2	-	6.5	-		

$t_{d(ON)}$ *1, 2	-	6.4	-	ns	V_{DS}=20V, I_D=6A, V_{GS}=10V, R_G=3Ω , R_L=0.5Ω
tr *1, 2	-	17.1	-		
$t_{d(OFF)}$ *1, 2	-	29.8	-		
t_f *1, 2	-	16	-		
Ciss	-	1560	-	pF	V_{GS}=0V, V_{DS}=15V, f=1MHz
Coss	-	195	-		
Crss	-	135	-		
Source-Drain Diode					
V_{SD} *1	-	-	1.2	V	I_S=1A, V_{GS}=0V
trr *1	-	29.6	-	ns	I_S=6A, dI_F/dt=100A/μs
Qrr *1	-	25.1	-	nC	

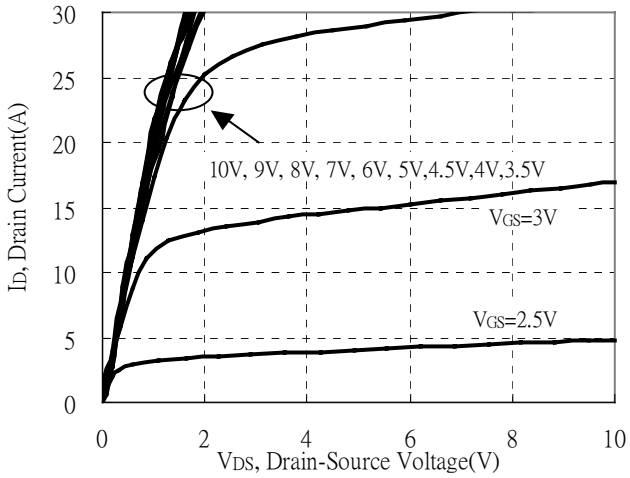
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

Recommended Soldering Footprint

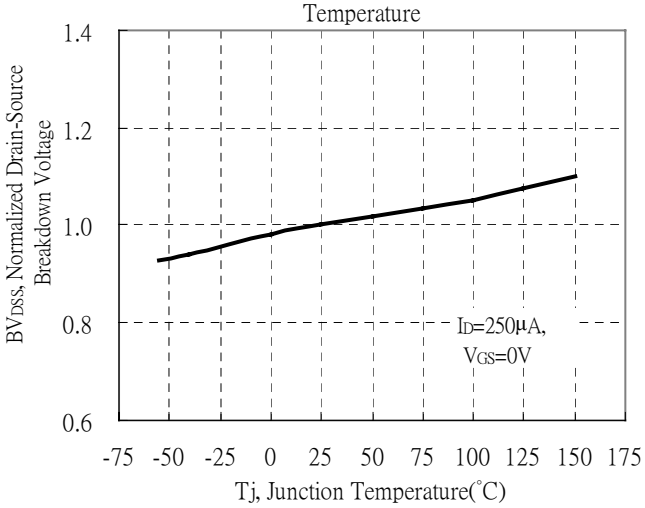


Typical Characteristics

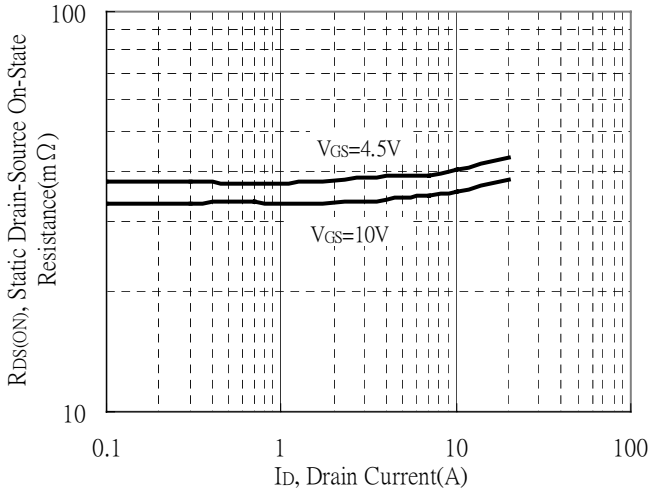
Typical Output Characteristics



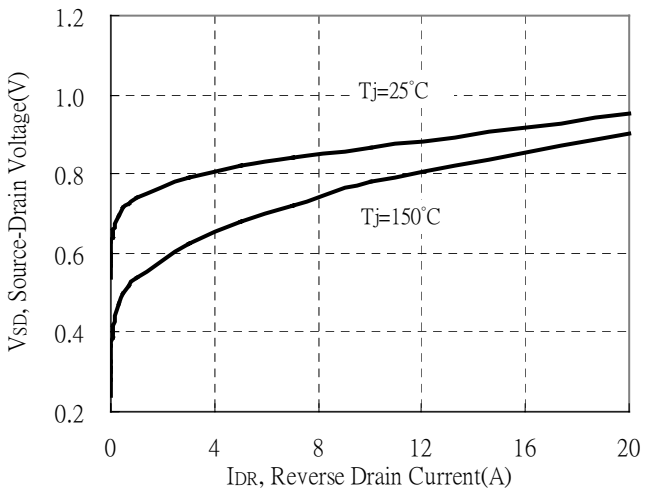
Normailzed Brekdown Voltage vs Ambient Temperature



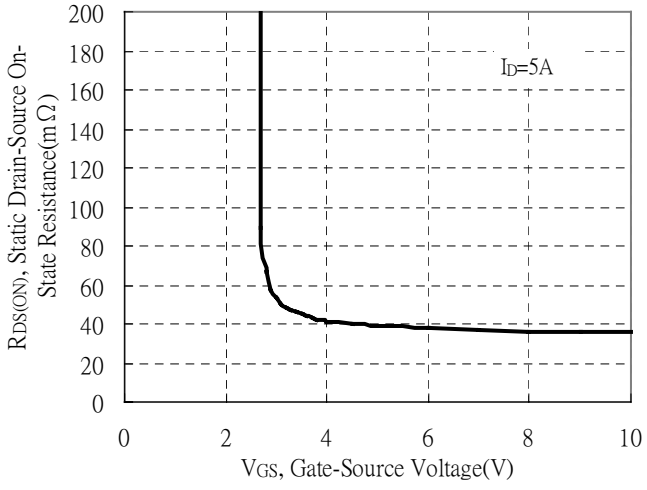
Static Drain-Source On-State resistance vs Drain Current



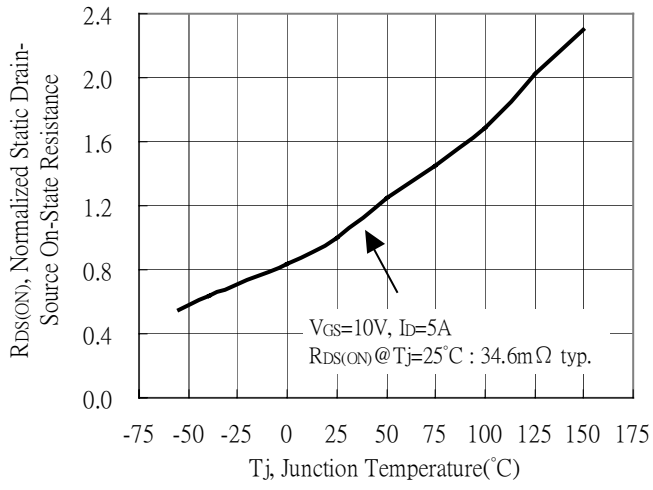
Reverse Drain Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

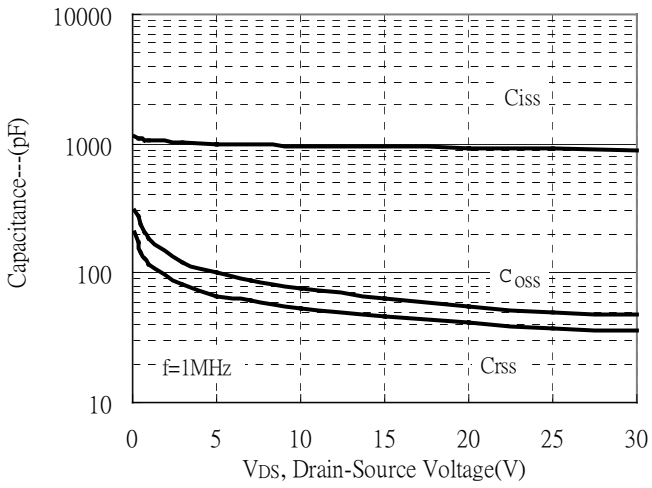


Normalized Drain-Source On-State Resistance vs Junction Tempearture

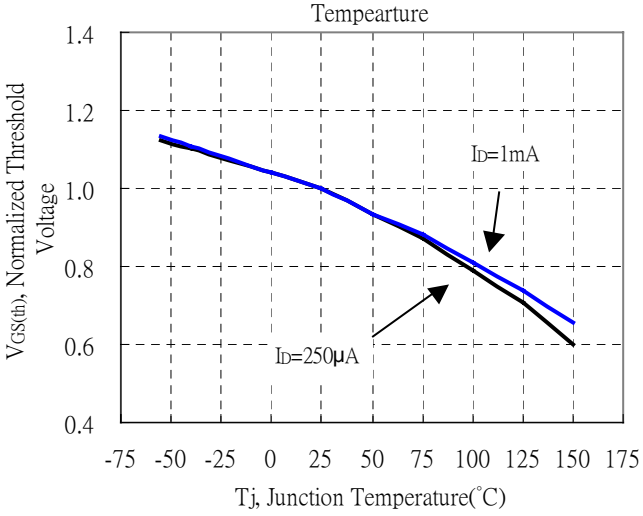


Typical Characteristics(Cont.)

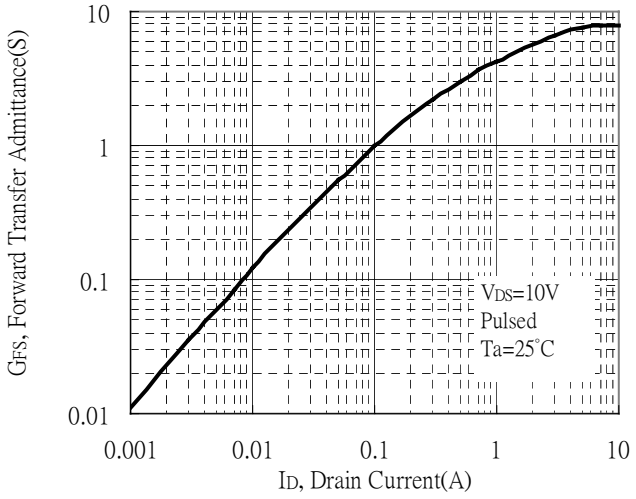
Capacitance vs Drain-to-Source Voltage



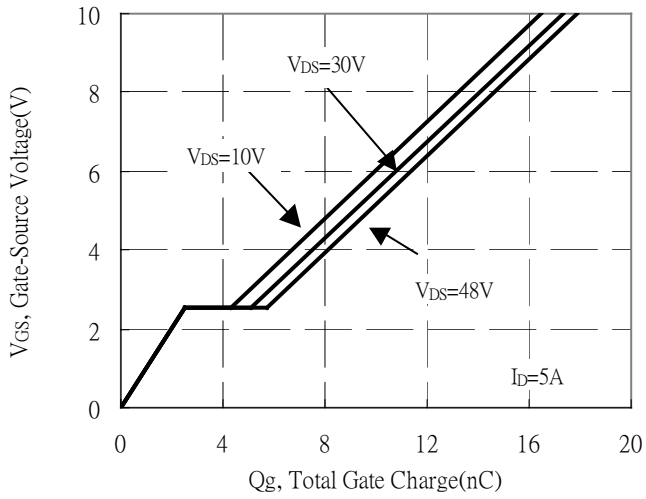
Normalized Threshold Voltage vs Junction Tempearture



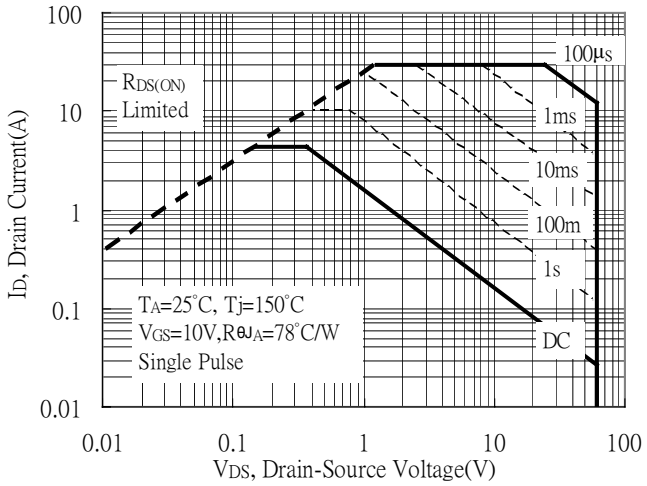
Forward Transfer Admittance vs Drain Current



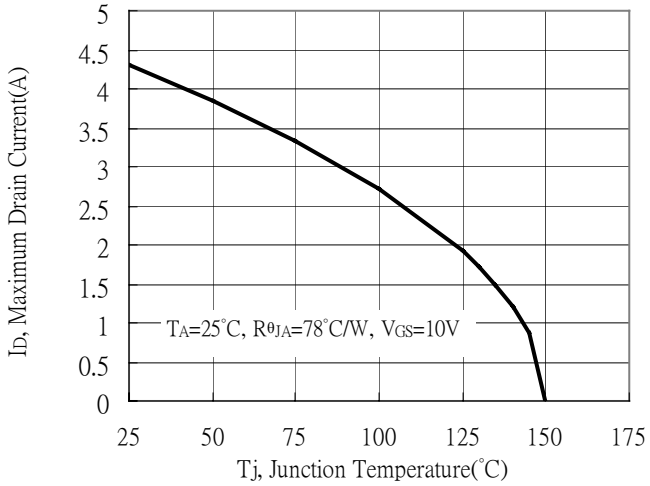
Gate Charge Characteristics



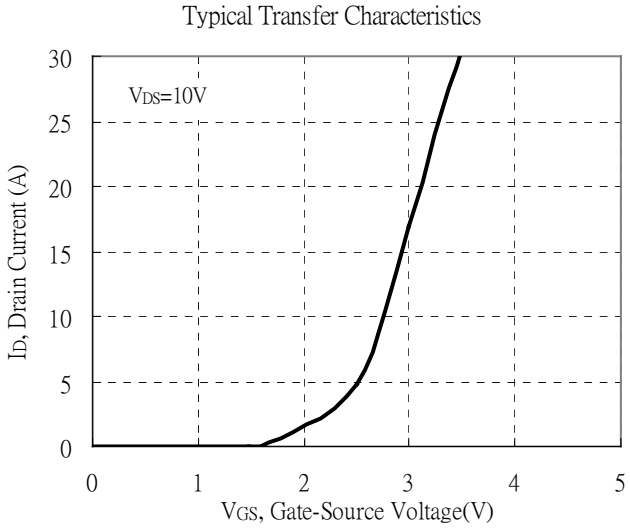
Maximum Safe Operating Area

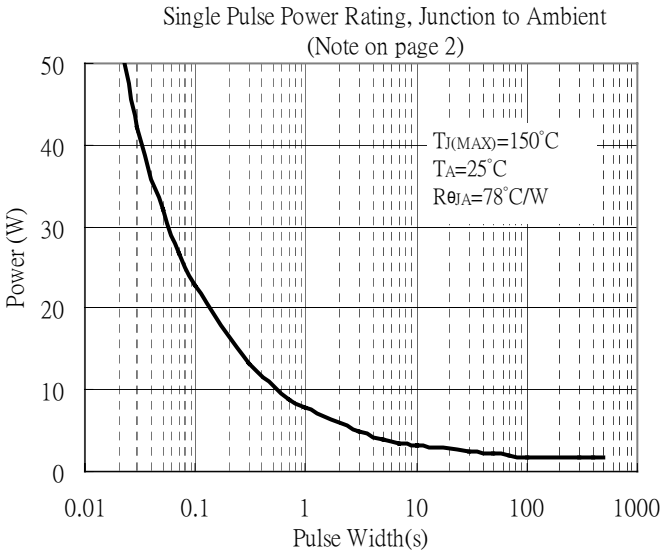


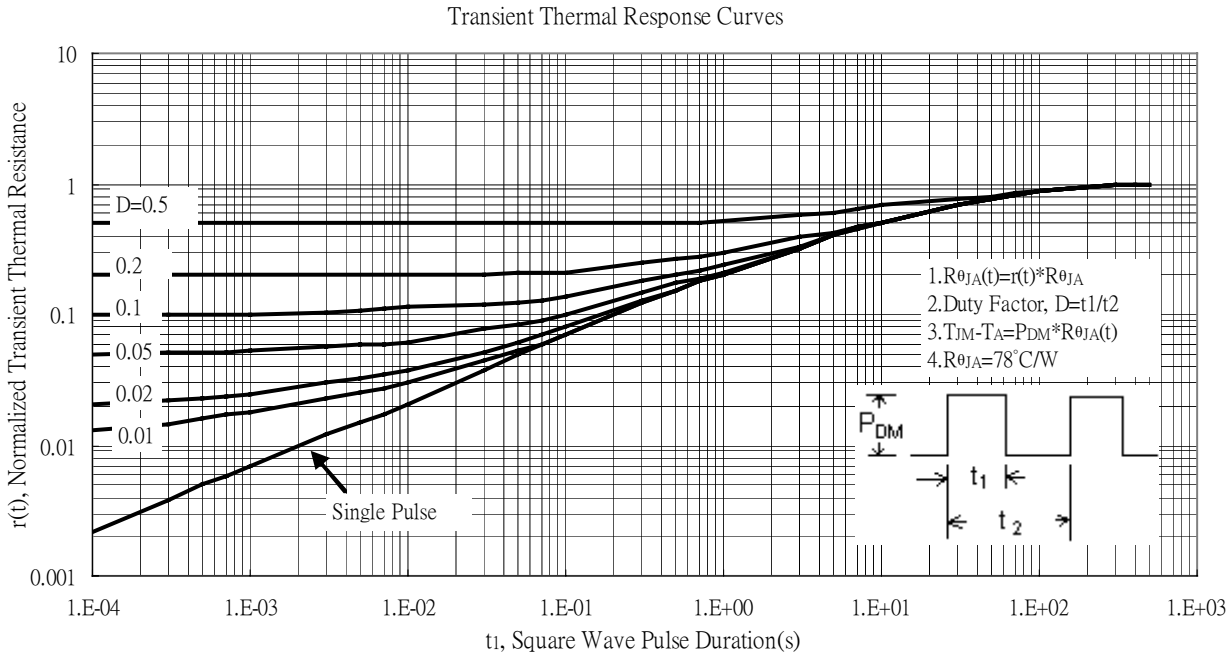
Maximum Drain Current vs Junction Temperature



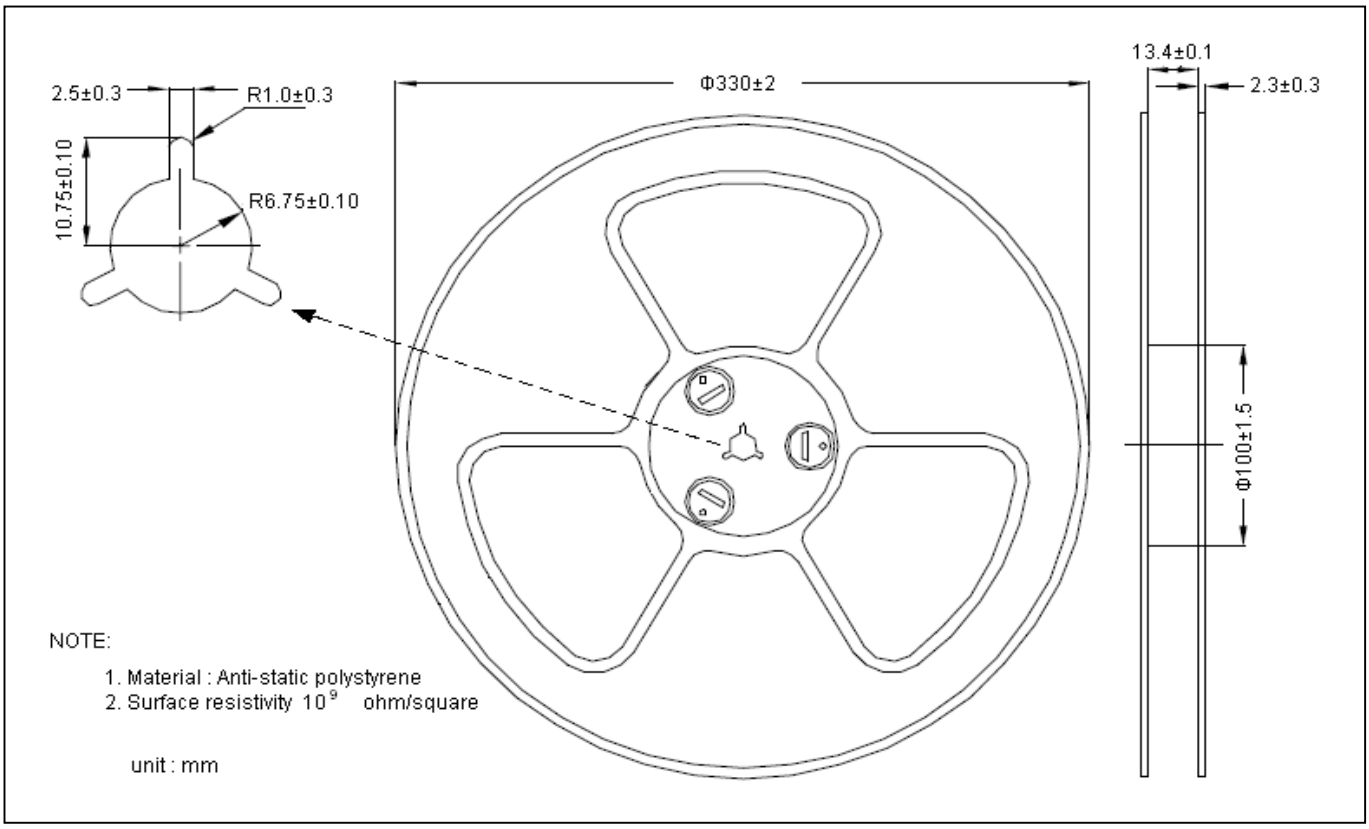
Typical Characteristics(Cont.)



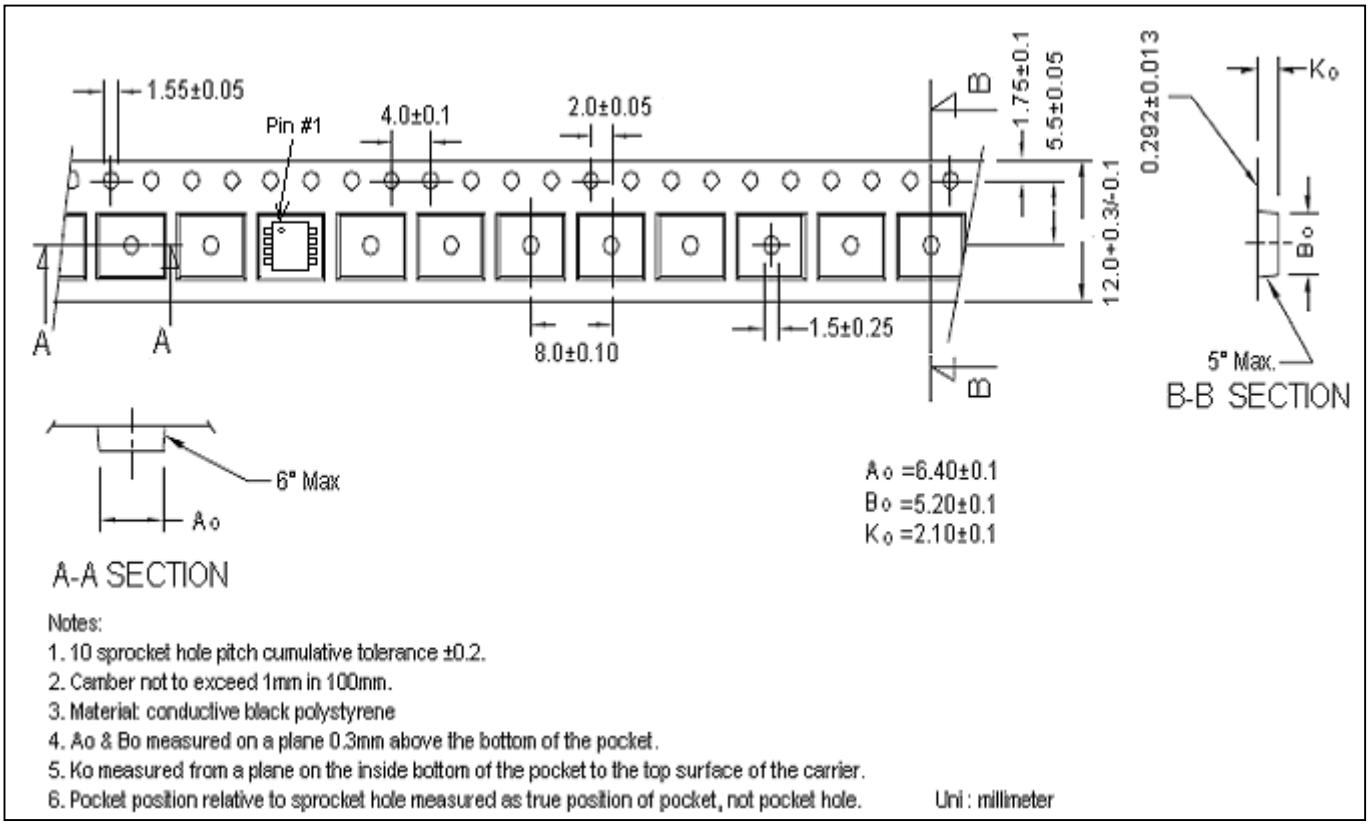




Reel Dimension



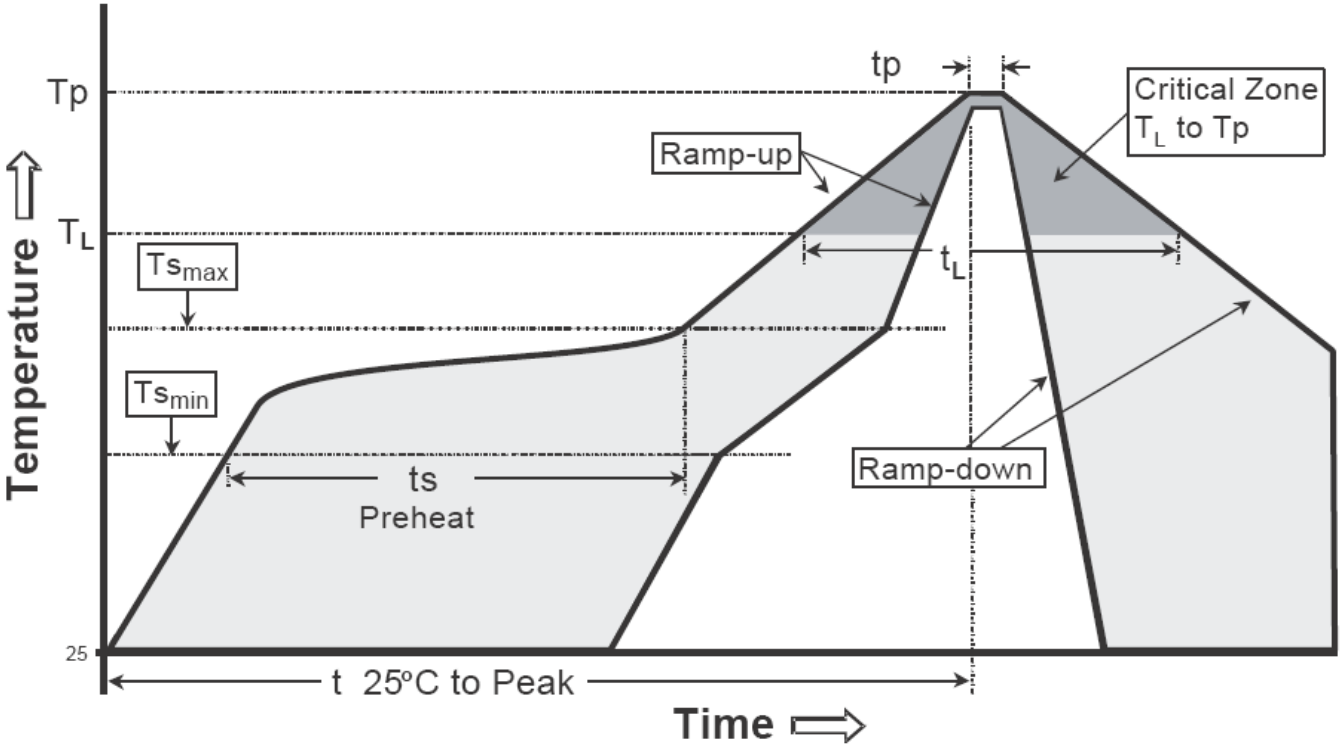
Carrier Tape Dimension



Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow

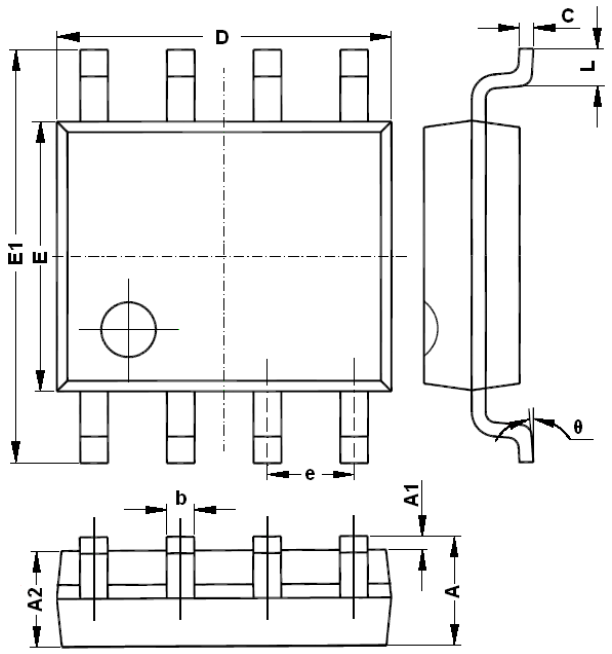


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(TP)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

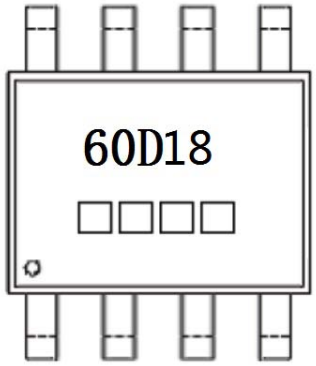
Note :1. All temperatures refer to topside of the package, measured on the package body surface.

2. For devices mounted on FR-4 PCB of 1.6mm or equivalent grade PCB. If other grade PCB is used, care should be taken to match the coefficients of thermal expansion between components and PCB. If they are not matched well, the solder joints may crack or the bodies of the parts may crack or shatter as the assembly cools.

SOP-8 Dimension



Marking:



Date Code(counting from left to right) :
1st code: year code, the last digit of Christian year
2nd code : month code, Jan→A, Feb→B, Mar→C, Apr→D
May→E, Jun→F, Jul→G, Aug→H, Sep→J,
Oct→K, Nov→L, Dec→M
3rd and 4th codes : prodcution serial number, 01~99

8-Lead SOP-8 Plastic Package
Package Code: Q8

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069	E	3.800	4.000	0.150	0.157
A1	0.100	0.250	0.004	0.010	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	e	1.270 (BSC)		0.050 (BSC)	
b	0.330	0.510	0.013	0.020	L	0.400	1.270	0.016	0.050
c	0.170	0.250	0.006	0.010	θ	0	8°	0	8°
D	4.700	5.100	0.185	0.200					

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.