

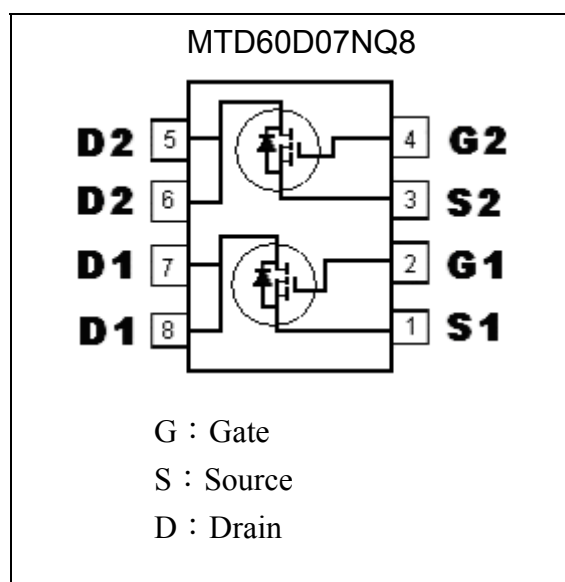
Dual N-Channel Enhancement Mode Power MOSFET

Features

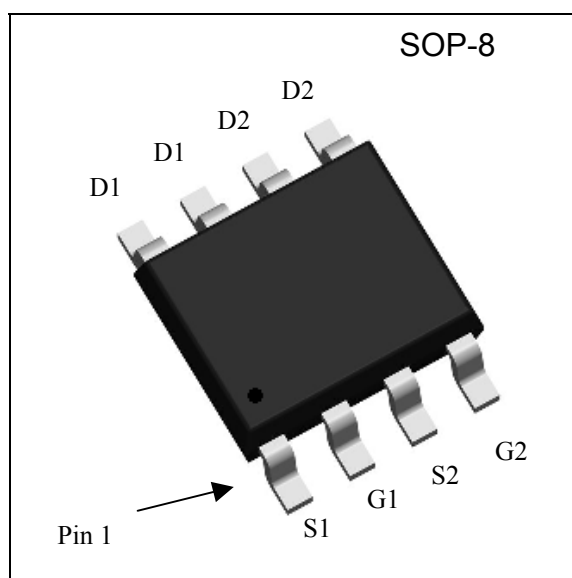
- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Dual N-ch MOSFET package
- Pb-free lead plating & Halogen-free package

BV_{DSS}	60V
I_D@V_{GS}=10V, T_A=25°C	4.3A
R_{DS(on)}@V_{GS}=10V, I_D=5A	34.6mΩ (typ)
R_{DS(on)}@V_{GS}=4.5V, I_D=3A	38.5mΩ (typ)

Equivalent Circuit

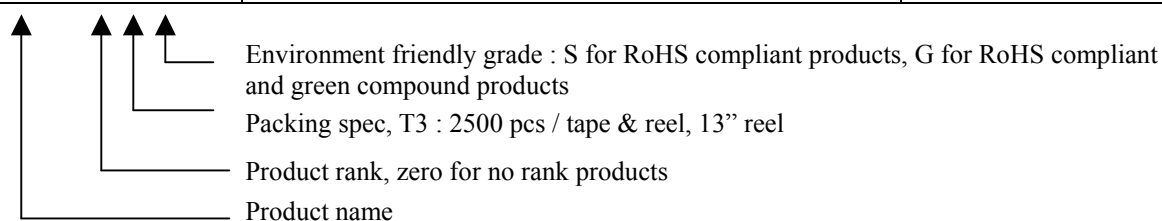


Outline



Ordering Information

Device	Package	Shipping
MTD60D07NQ8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel



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	7.0	A
Continuous Drain Current @ V _{GS} =10V, T _C =100°C		4.4	
Continuous Drain Current @ V _{GS} =10V, T _A =25°C		4.3 (Note 2)	
Continuous Drain Current @ V _{GS} =10V, T _A =100°C		2.7 (Note 2)	
Pulsed Drain Current	I _{DM}	30 (Note 1)	
Single Pulse Avalanche Current @ L=0.1mH	I _{AS}	14	
Single Pulse Avalanche Energy@L=1mH, I _{AS} =7A, V _{DD} =15V	E _{AS}	24.5 (Note 4)	mJ
Power Dissipation for Dual Operation	P _D	2	W
Power Dissipation for Single Operation		1.6 (Note 2)	
		0.9 (Note 3)	
Operating Junction and Storage Temperature Range	T _j , T _{stg}	-55~+150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{θJC}	30	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{θJA}	62.5	
		78 (Note 2)	
		135 (Note 3)	

- 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 (T_j=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	-	2.5		V _{DS} =V _{GS} , I _D =250μA
G _{FS} *1	-	7.5	-	S	V _{DS} =10V, I _D =5A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =48V, V _{GS} =0V
	-	-	25		V _{DS} =40V, V _{GS} =0V, T _j =125°C
R _{DS(ON)} *1	-	34.6	50	mΩ	V _{GS} =10V, I _D =5A
	-	38.5	60		V _{GS} =4.5V, I _D =3A
Dynamic					
Q _g *1, 2	-	17.3	-	nC	V _{DS} =30V, I _D =5A, V _{GS} =10V
Q _{gs} *1, 2	-	2.5	-		
Q _{gd} *1, 2	-	2.6	-		

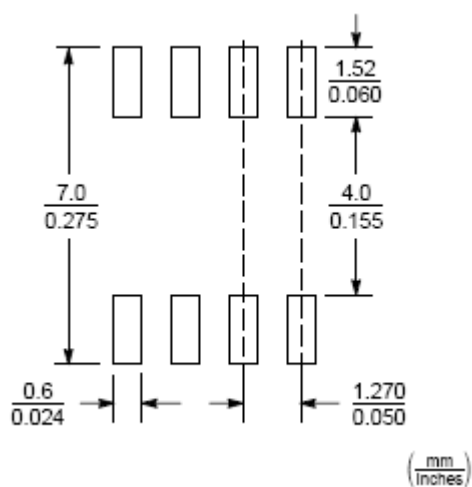
td(ON) *1, 2	-	8.6	-	ns	VDS=30V, ID=5A, VGS=10V, RG=1 Ω
tr *1, 2	-	17.8	-		
td(OFF) *1, 2	-	32	-		
tf *1, 2	-	6	-		
Ciss	-	903	-	pF	VGS=0V, VDS=30V, f=1MHz
Coss	-	48	-		
Crss	-	36	-		
Source-Drain Diode					
Is *1	-	-	2.3	A	
ISM *3	-	-	9.2		
VSD *1	-	0.78	1.2	V	IS=2.3A, VGS=0V
trr *1	-	11.9	-	ns	IF=2.3A, dIF/dt=100A/μs
Orr *1	-	7.2	-	nC	

Note : *1.Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

*2.Independent of operating temperature

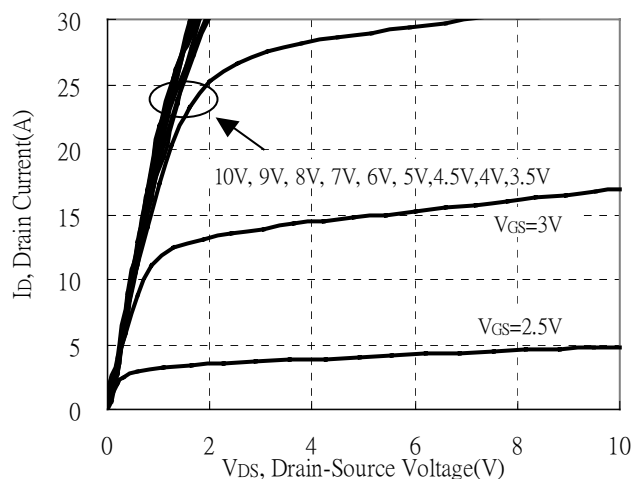
*3.Pulse width limited by maximum junction temperature.

Recommended Soldering Footprint

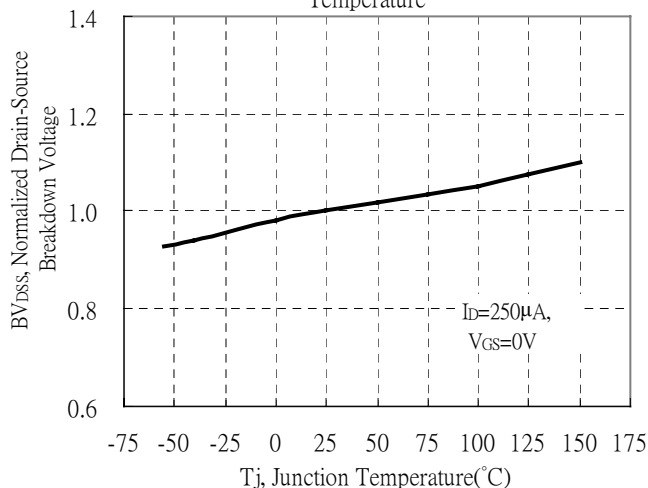


Typical Characteristics

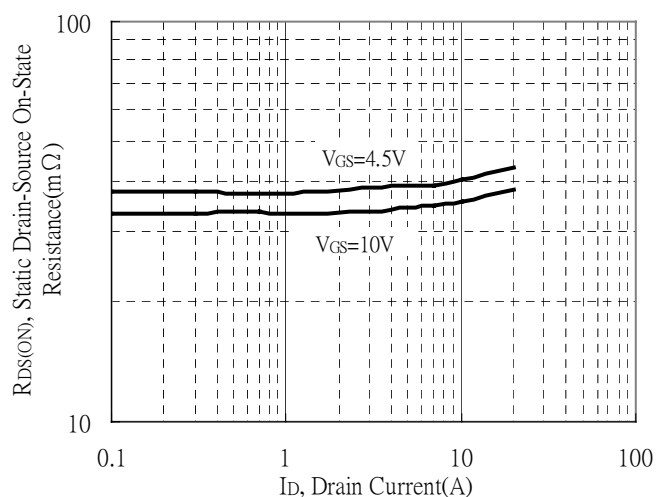
Typical Output Characteristics



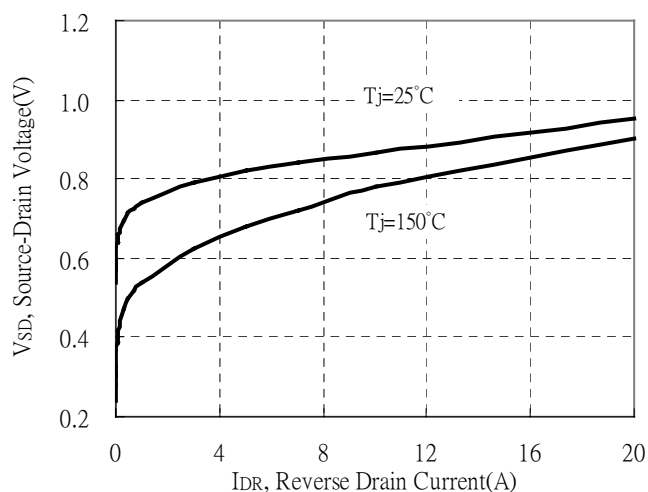
Normalized Breakdown Voltage vs Ambient Temperature



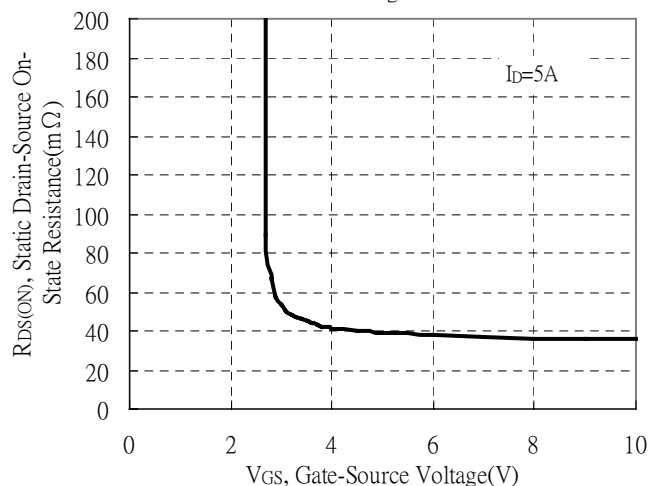
Static Drain-Source On-State resistance vs Drain Current



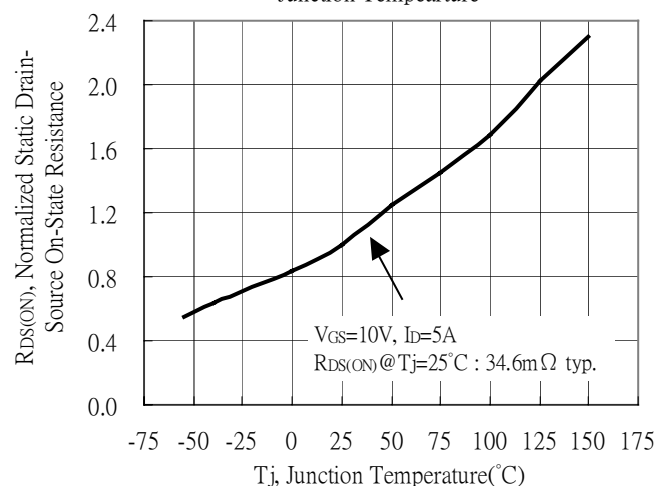
Reverse Drain Current vs Source-Drain Voltage



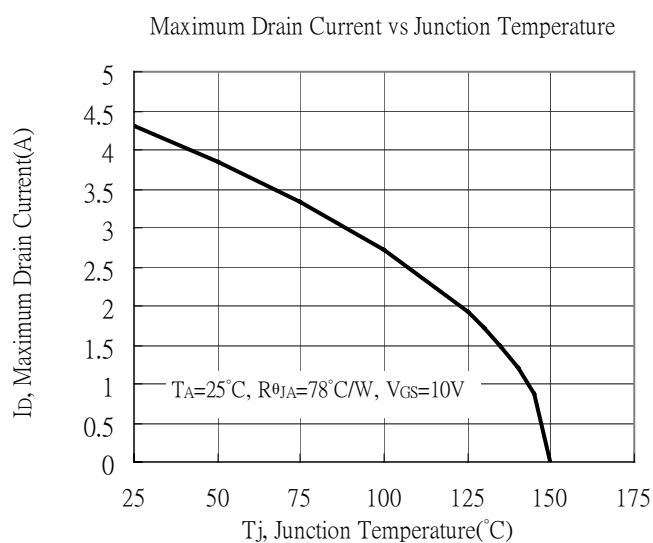
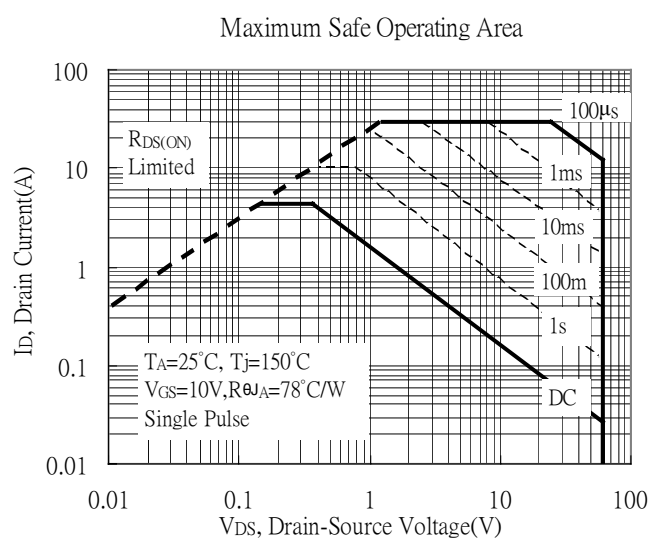
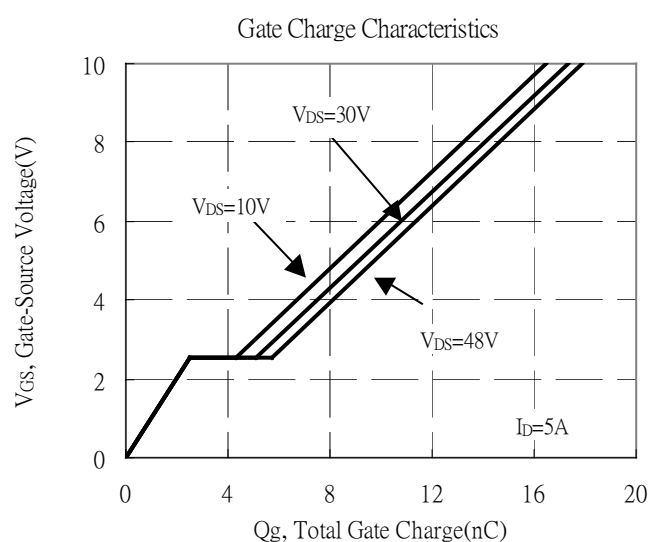
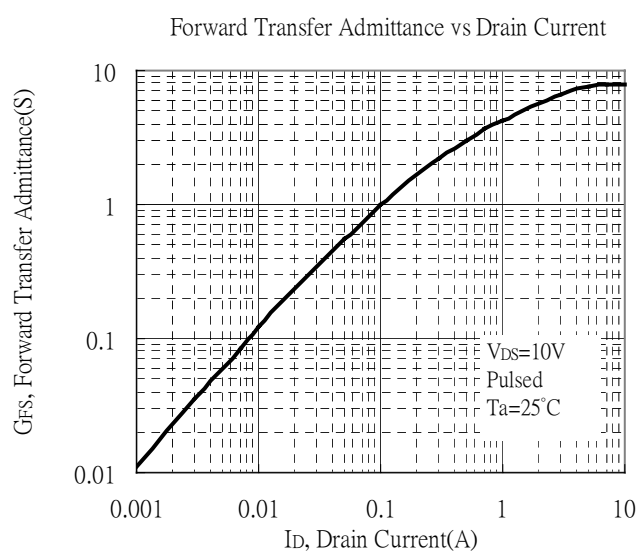
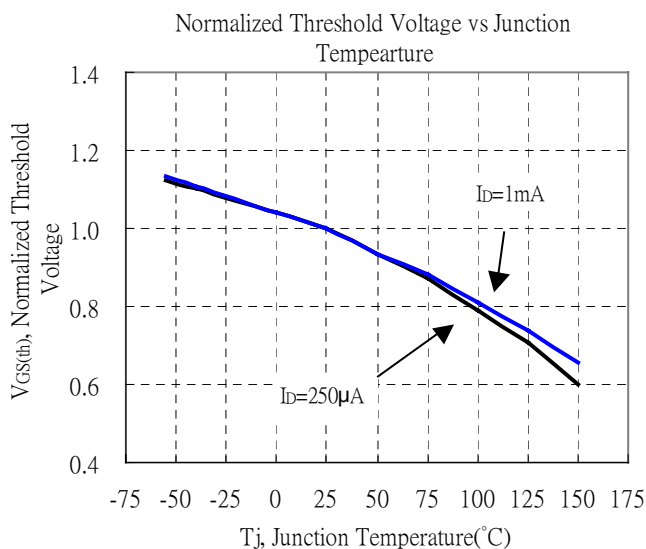
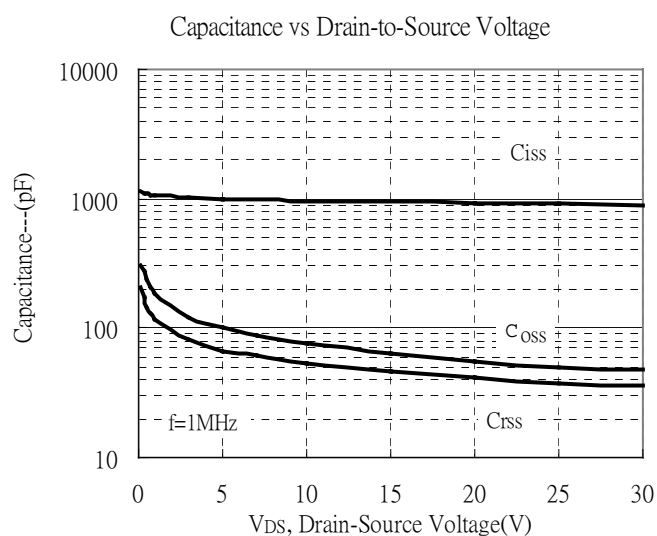
Static Drain-Source On-State Resistance vs Gate-Source Voltage



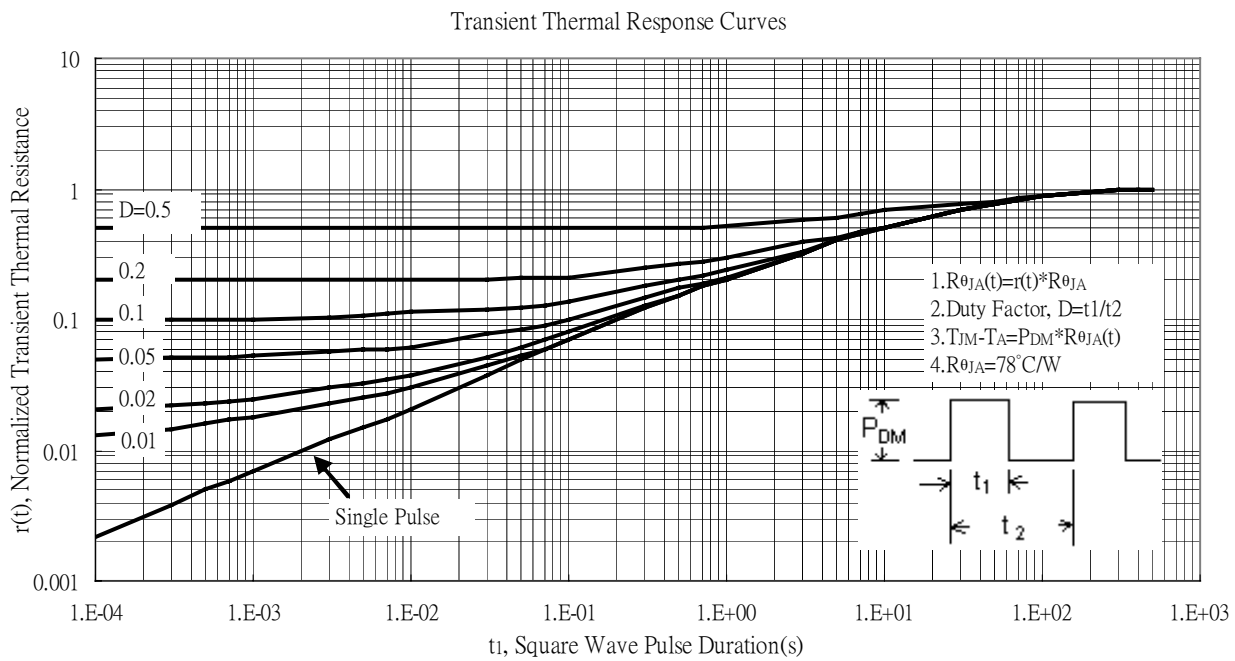
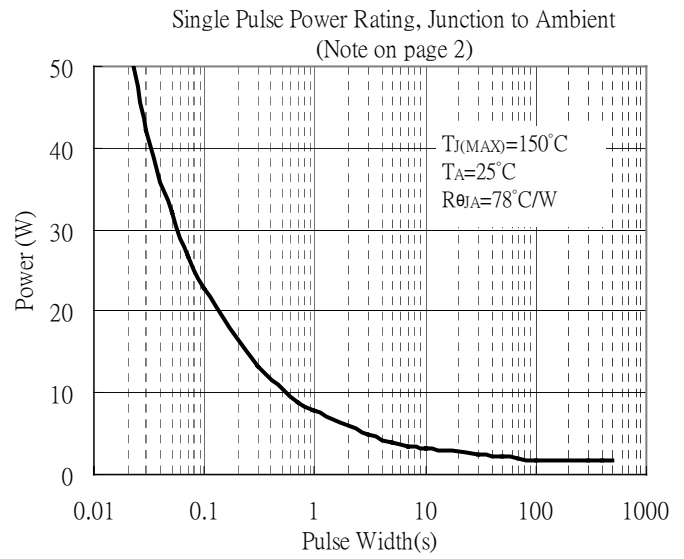
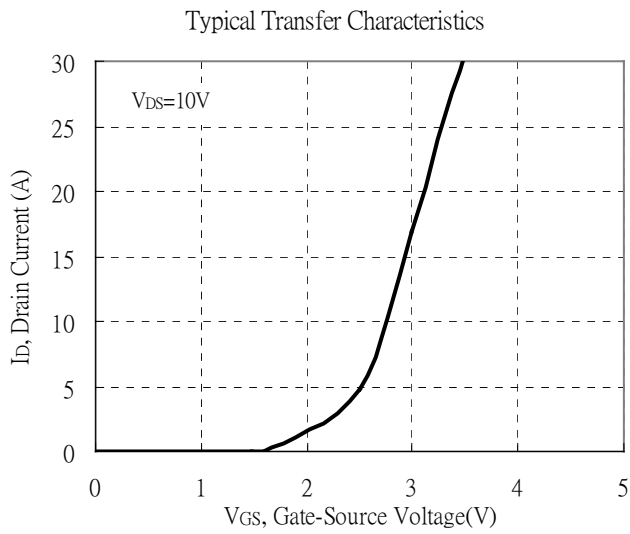
Normalized Drain-Source On-State Resistance vs Junction Temperature



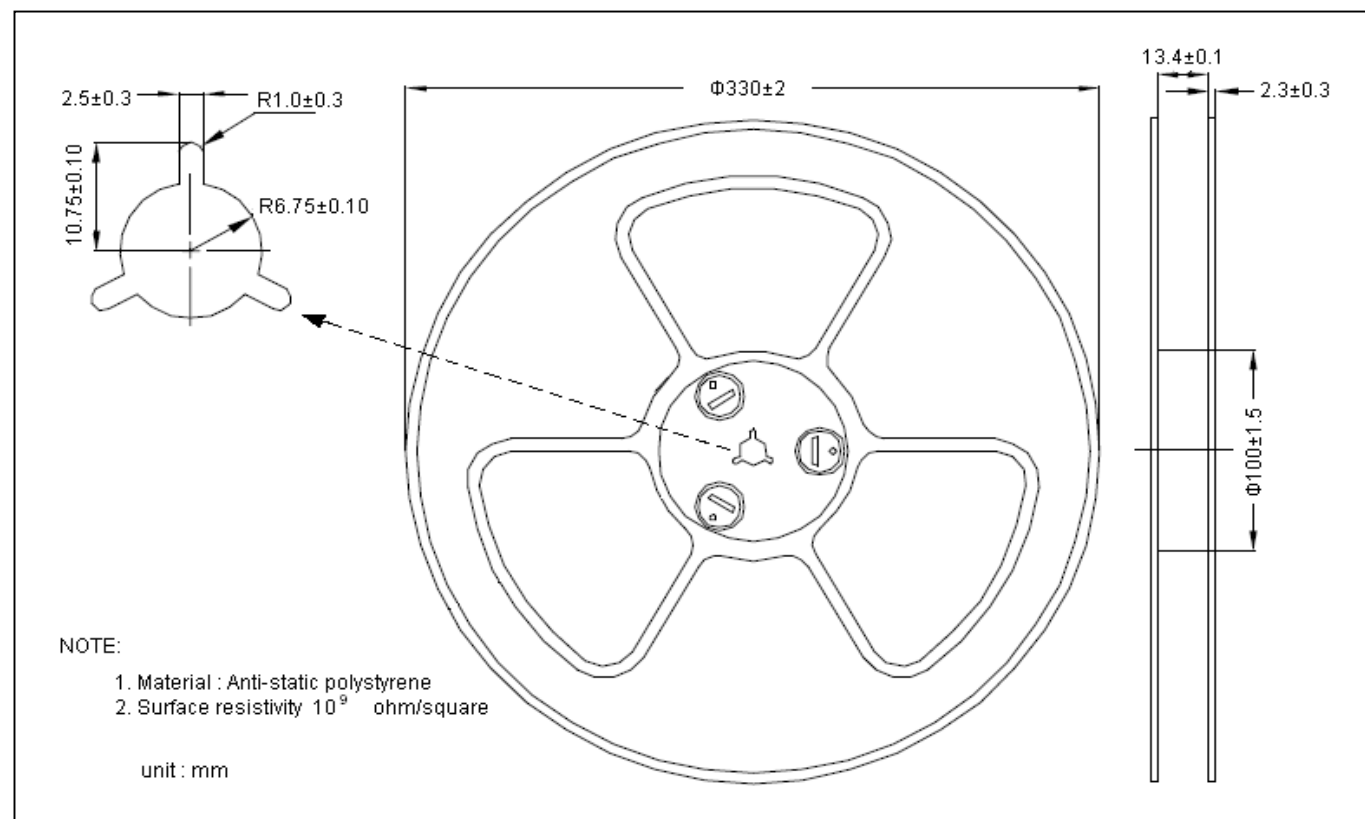
Typical Characteristics(Cont.)



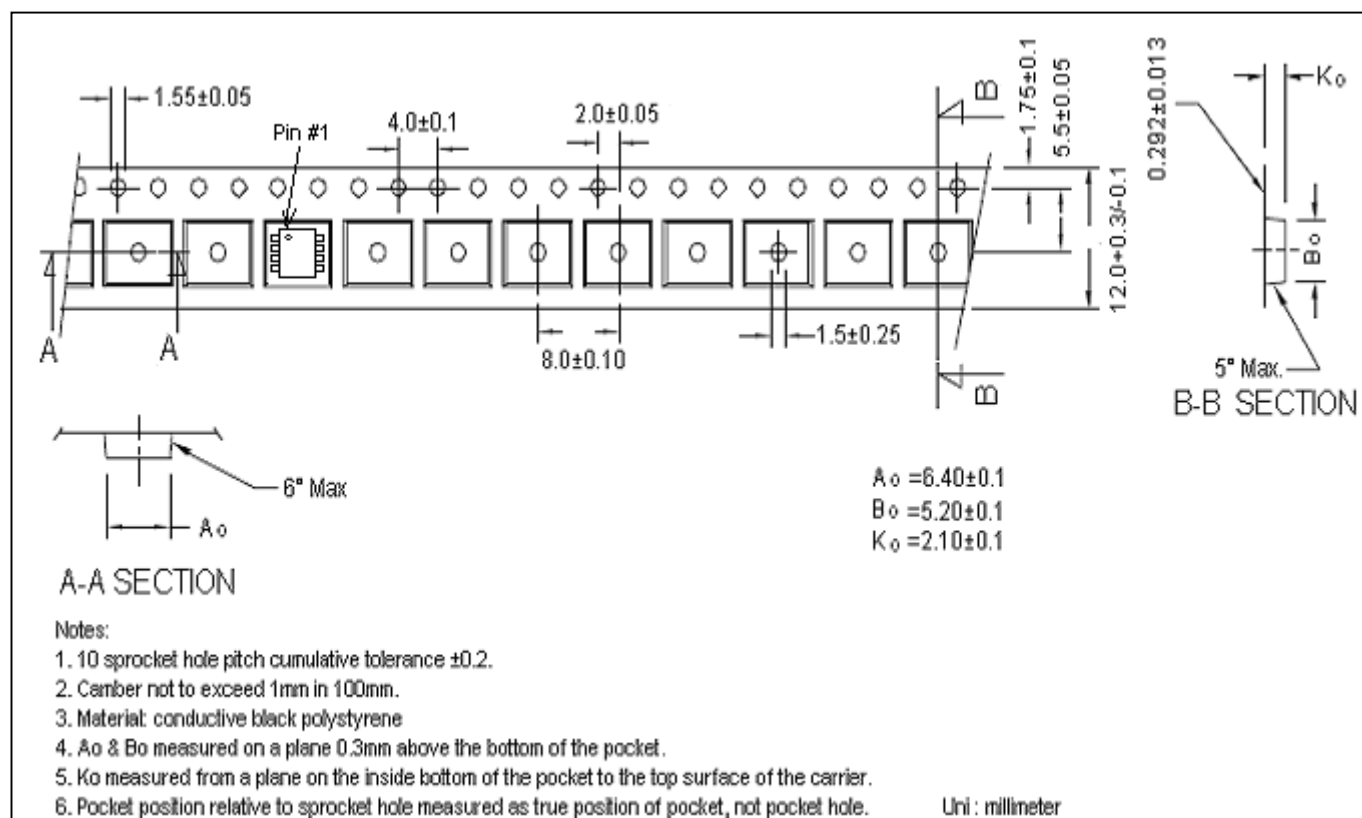
Typical Characteristics(Cont.)



Reel Dimension



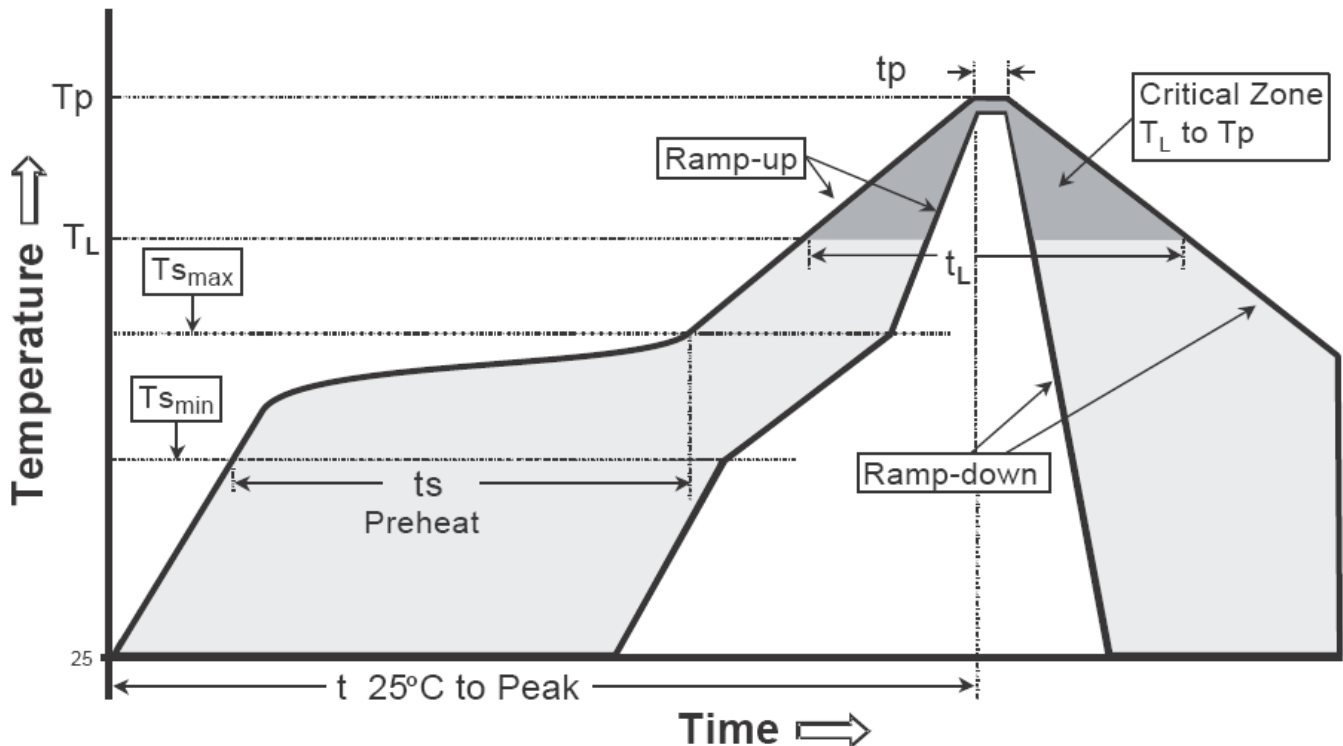
Carrier Tape Dimension



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

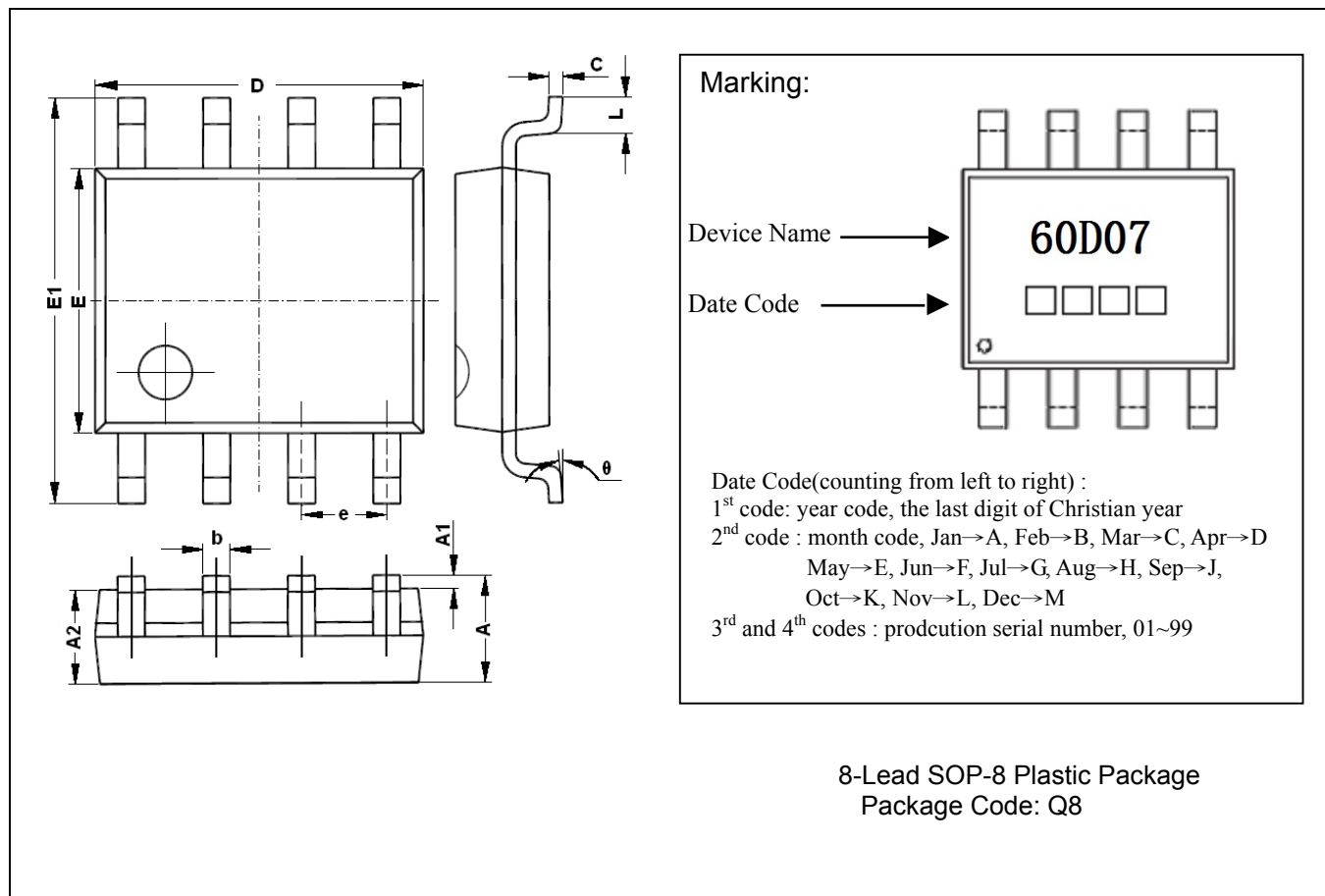


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T_{smax} to T_p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T_{smin})	100°C	150°C
-Temperature Max(T_{smax})	150°C	200°C
-Time(t_{smin} to t_{smax})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T_L)	183°C	217°C
- Time (t_L)	60-150 seconds	60-150 seconds
Peak Temperature(T_p)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(t_p)	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



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.