N-Channel Enhancement Mode Power MOSFET

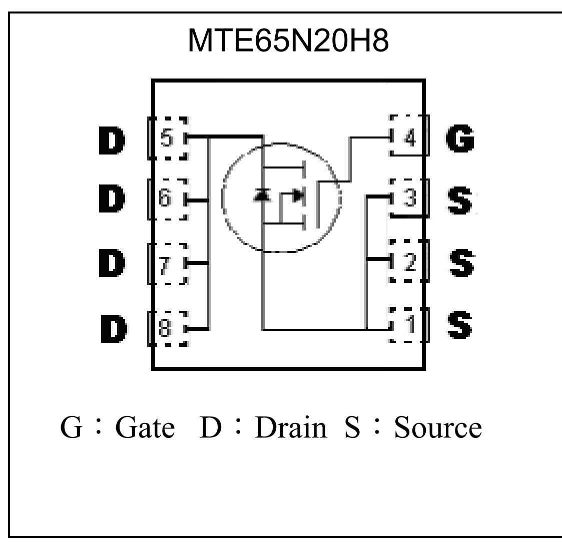
MTE65N20H8

BV_{DSS}		200V
I_D @V_{GS}=10V, T_C=25°C		24A
$R_{DSON(TYP)}$	V_{GS}=10V, I_D=11A	61mΩ

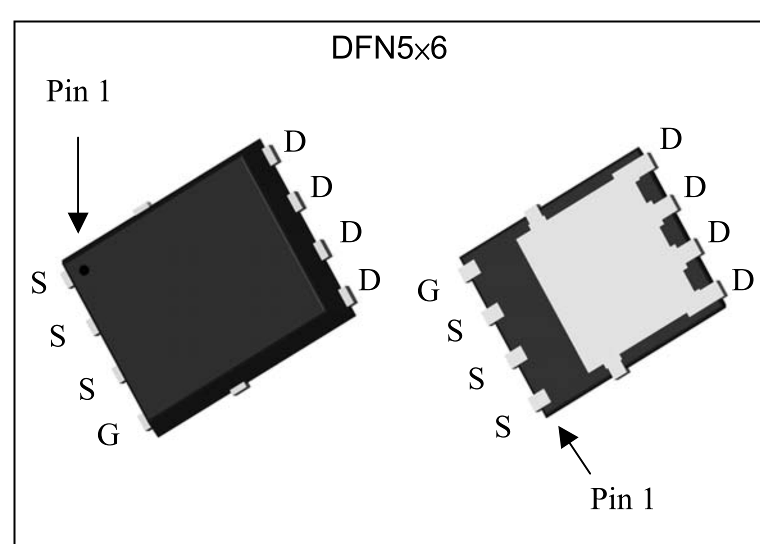
Features

- Single Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- Repetitive Avalanche Rated
- Pb-free lead plating and Halogen-free package

Symbol

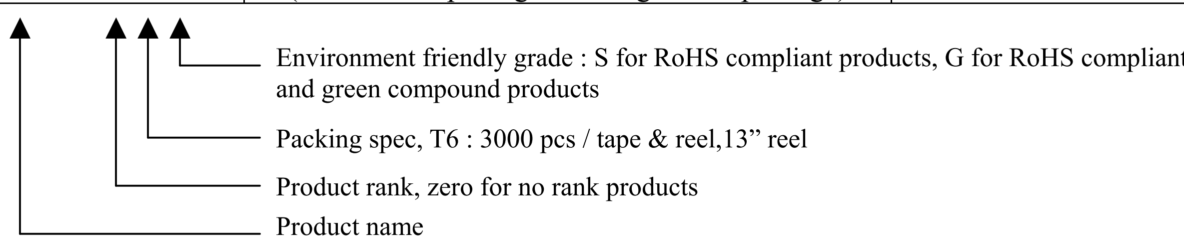


Outline



Ordering Information

Device	Package	Shipping
MTE65N20H8-0-T6-G	DFN 5 x6 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel



Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	200	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ T_C=25°C, V_{GS}=10V (Note 1)		I_D	24	A
Continuous Drain Current @ T_C=100°C, V_{GS}=10V (Note 1)			17	
Continuous Drain Current @ T_A=25°C, V_{GS}=10V (Note 2)		I_{DSM}	3.7 *3	
Continuous Drain Current @ T_A=70°C, V_{GS}=10V (Note 2)			2.9 *3	
Pulsed Drain Current (Note 3)		I_{DM}	77 *1	
Avalanche Current (Note 3)		I_{AS}	9	
Avalanche Energy @ L=2mH, I_D=9A, V_{DD}=50V (Note 5)		E_{AS}	81	mJ
Repetitive Avalanche Energy @ L=0.05mH (Note 3)		E_{AR}	11 *2	
Total Power Dissipation	T_C=25℃ (Note 1)	P_D	107	W
	T_C=100℃ (Note 1)		53.5	
	T_A=25°C (Note 2)	P_{DSM}	2.5	
	T_A=70°C (Note 2)		1.6	
Operating Junction and Storage Temperature Range		Tj, Tstg	-55~+175	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	1.4	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 2)	$R_{\theta JA}$	50	
Thermal Resistance, Junction-to-ambient, max (Note 4)		125	

Note : 1. The power dissipation P_D is based on $T_{J(MAX)}$=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

2. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

3. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=175°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

4. When mounted on the minimum pad size recommended (PCB mount), t≤10s.

5. 100% tested by conditions of L=2mH, I_{AS}=5A, V_{GS}=10V, V_{DD}=50V

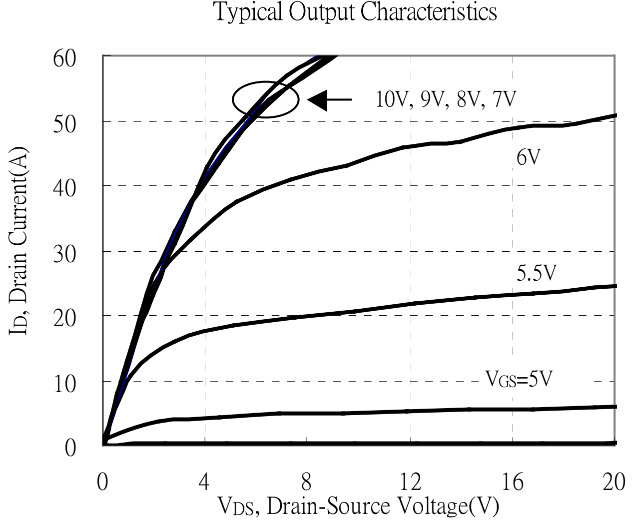
Characteristics (Tc=25°C, unless otherwise specified)

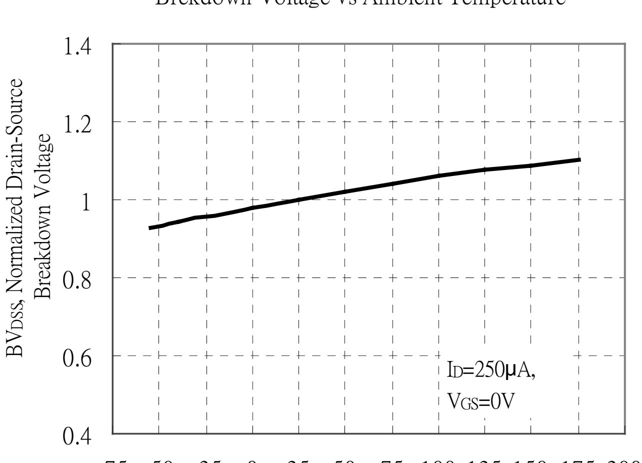
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	200	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.2	-	V/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	2	-	4	V	V_{DS} = V_{GS}, I_D=250μA
G_{FS} *1	-	15	-	S	V_{DS} =15V, I_D=11A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V
I_{DSS}	-	-	1	μA	V_{DS} =200V, V_{GS} =0V
	-	-	25		V_{DS} =160V, V_{GS} =0V, Tj=125°C
$R_{DS(ON)}$ *1	-	61	80	mΩ	V_{GS} =10V, I_D=11A

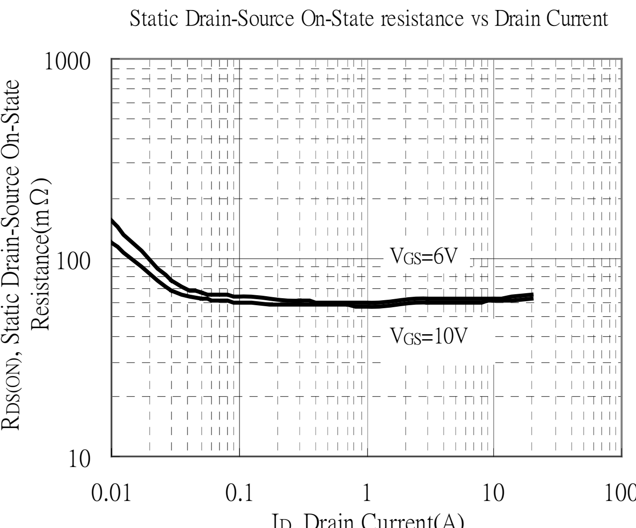
Dynamic					
Ciss	-	1812	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Coss	-	178	-		
Crss	-	72	-		
Qg *1, 2	-	44.2	-	nC	I_D=11A, V_{DS}=160V, V_{GS}=10V
Qgs *1, 2	-	8.6	-		
Qgd *1, 2	-	16.7	-		
$t_{d(ON)}$ *1, 2	-	23	-	ns	V_{DS}=100V, I_D=11A, V_{GS}=10V, R_G=25Ω
tr *1, 2	-	60.4	-		
$t_{d(OFF)}$ *1, 2	-	118.6	-		
t_f *1, 2	-	78	-		
Rg	-	1.7	-	Ω	f=1MHz
Source-Drain Diode					
I_S *1	-	-	24	A	
I_{SM} *3	-	-	77		
V_{SD} *1	-	0.81	1.3	V	I_S=20A, V_{GS}=0V
trr	-	62	-	ns	I_F=11A, dI_F/dt=100A/μs
Qrr	-	187	-	nC	

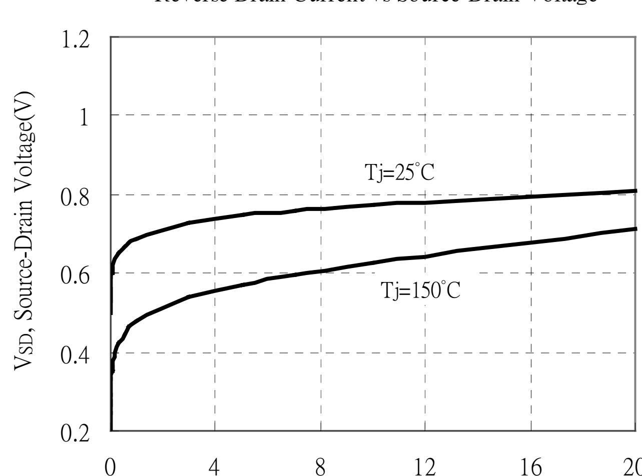
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

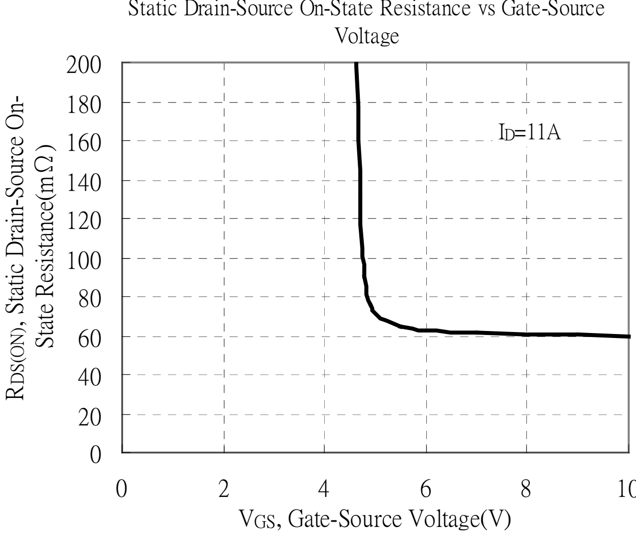
Typical Characteristics

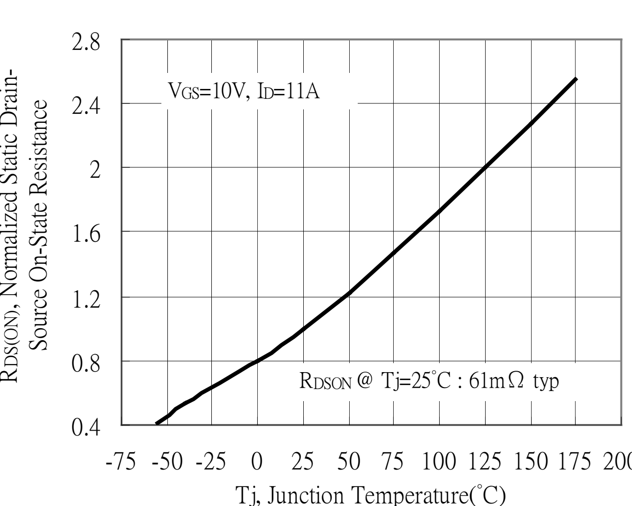




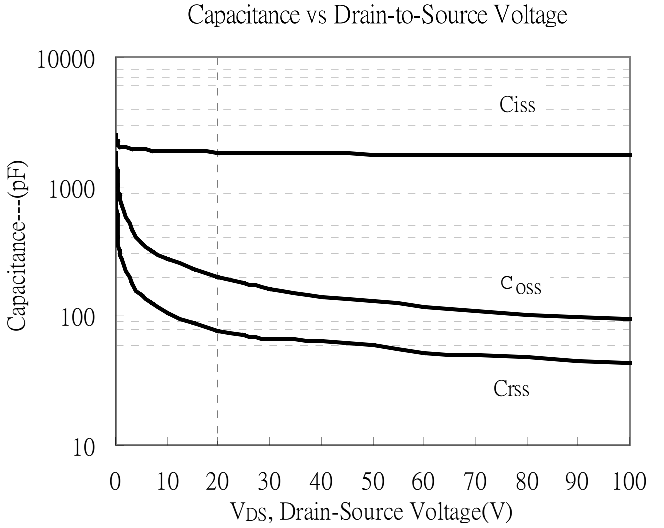


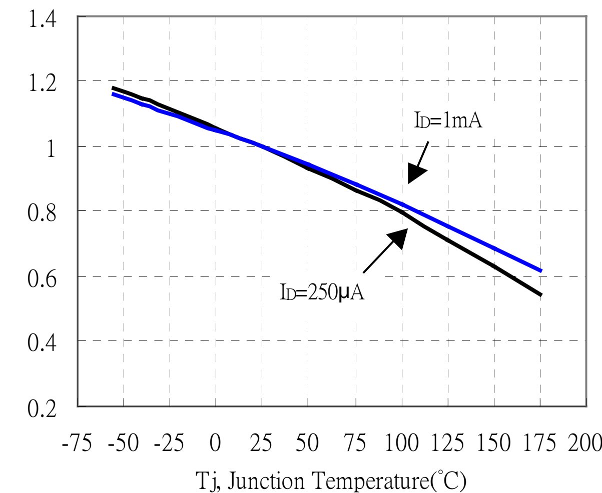


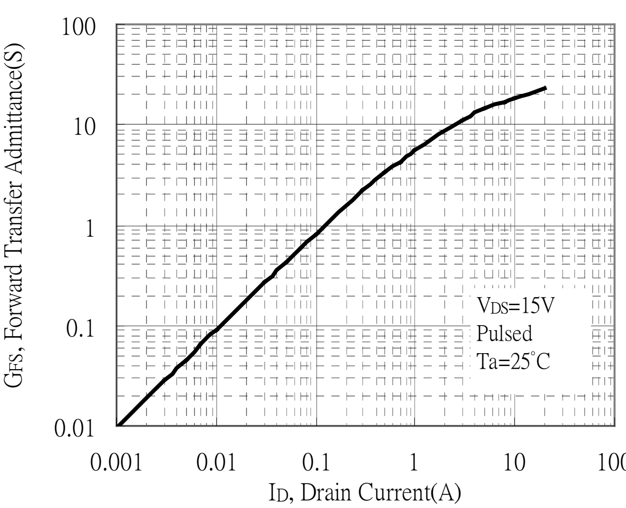


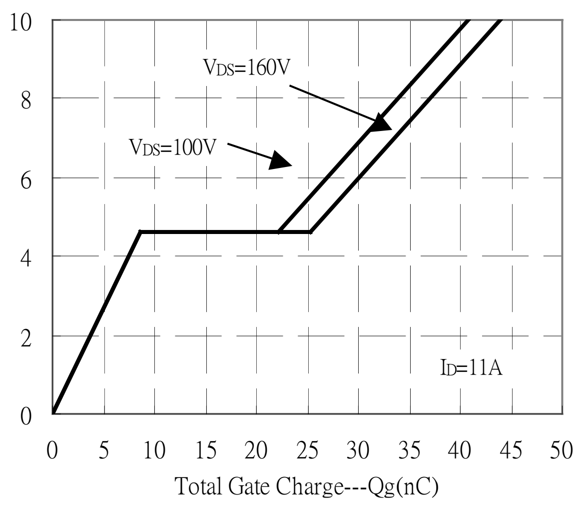


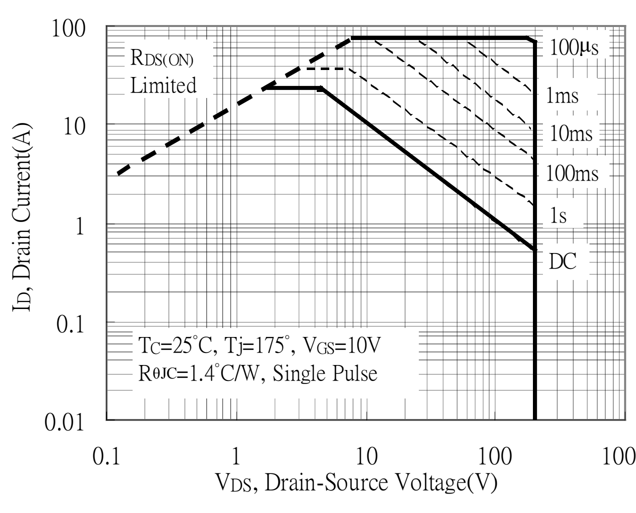
Typical Characteristics(Cont.)

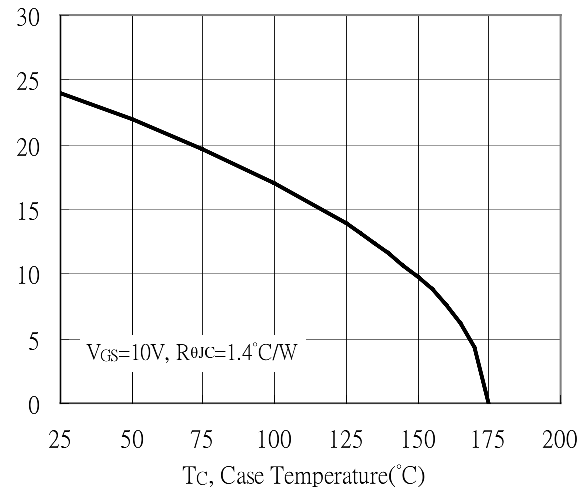




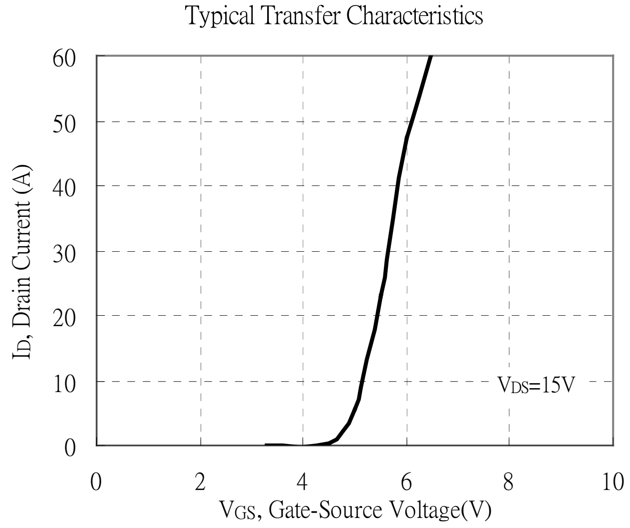


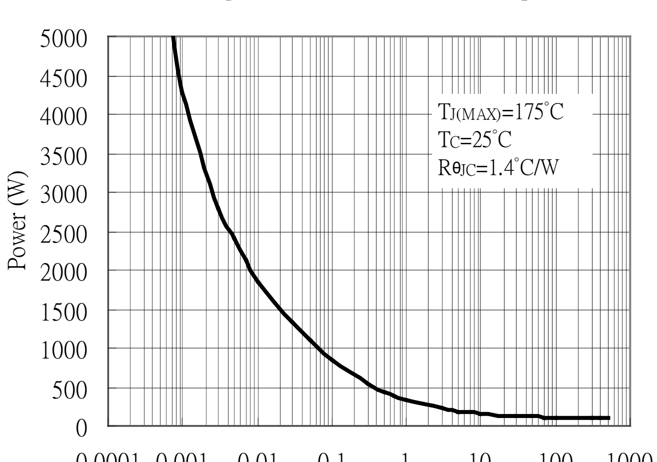






Typical Characteristics(Cont.)





Transient Thermal Response Curves

r(t), Normalized Effective Transient Thermal Resistance

1
0.1
0.01
0.001

D=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse

1.RθJC(t)=r(t)*RθJC
2.Duty Factor, D=t1/t2
3.TJM-TC=PDM*RθJC(t)
4.RθJC=1.4°C/W

PDM
t1
t2

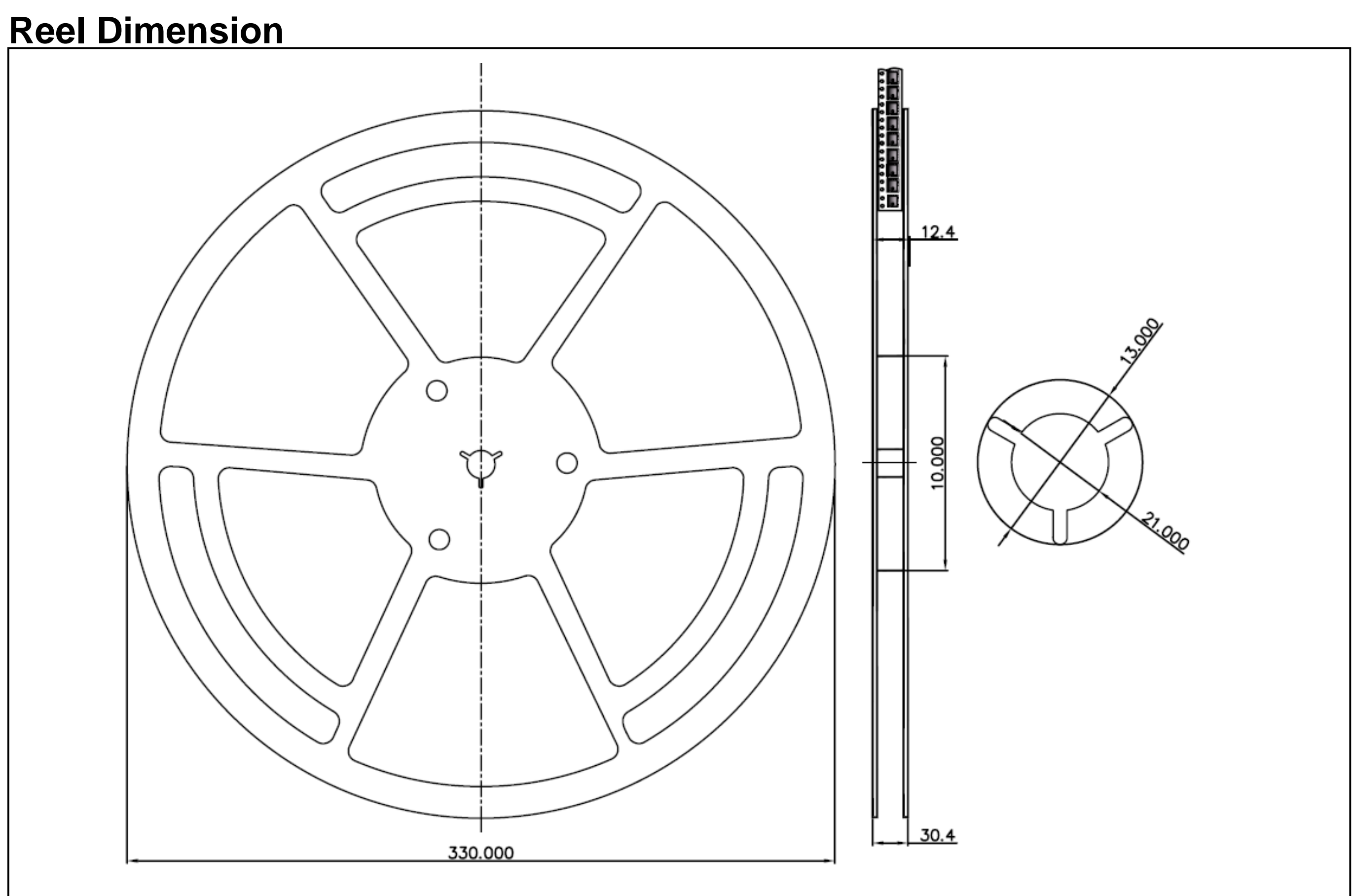
1.E-04
1.E-03
1.E-02
1.E-01
1.E+00
1.E+01
1.E+02
1.E+03

t1, Square Wave Pulse Duration(s)

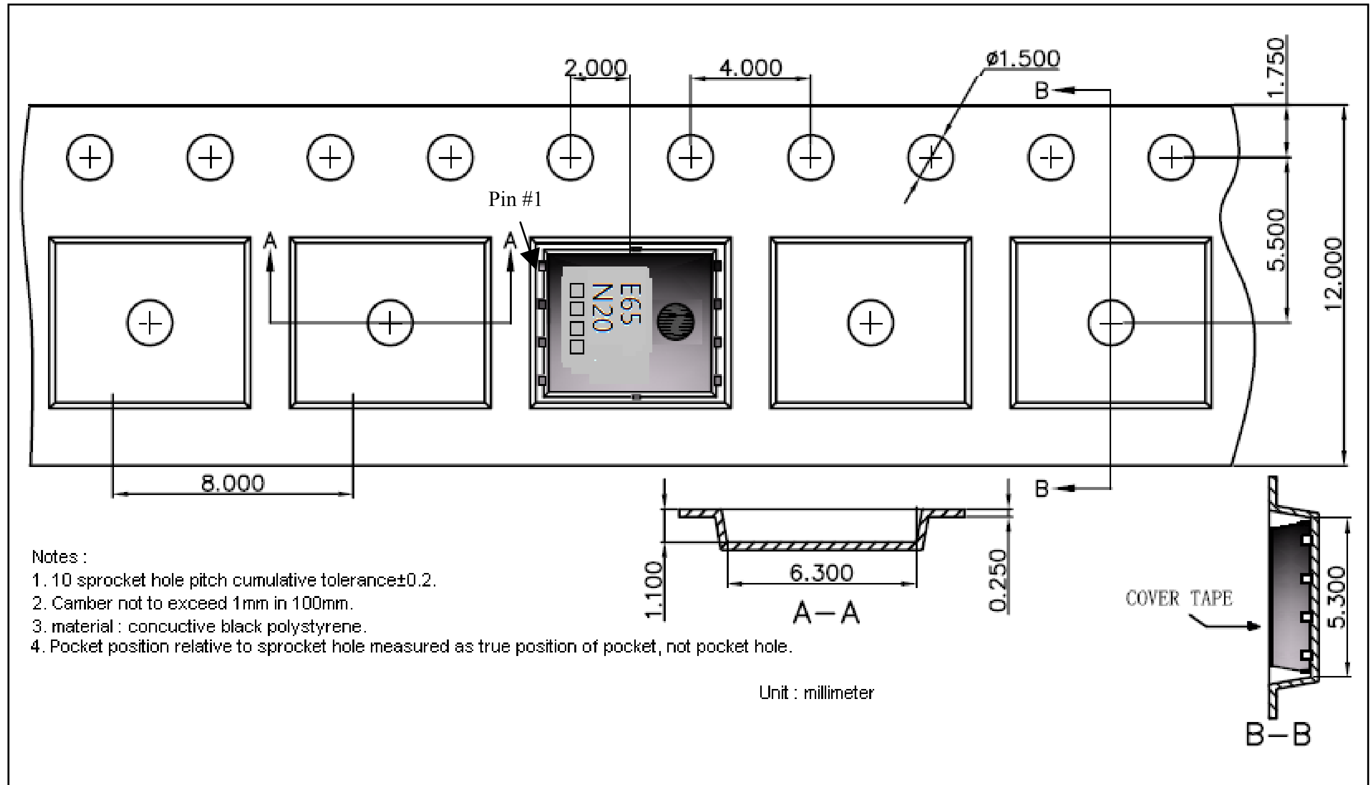
Recommended Soldering Footprint & Stencil Design

unit : mm

Reel Dimension



Carrier Tape Dimension



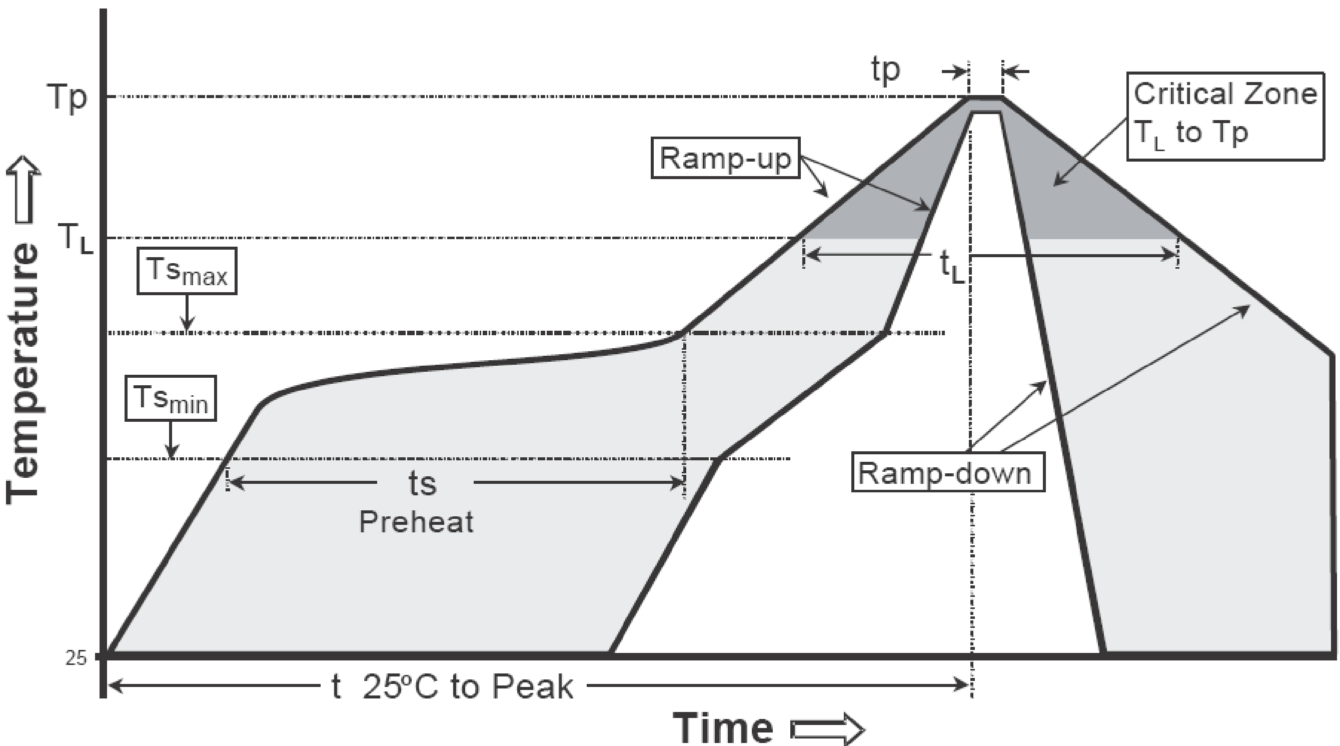
Notes :
1. 10 sprocket hole pitch cumulative tolerance±0.2.
2. Camber not to exceed 1mm in 100mm.
3. material : concuctive black polystyrene.
4. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Unit : millimeter

Recommended wave soldering condition

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

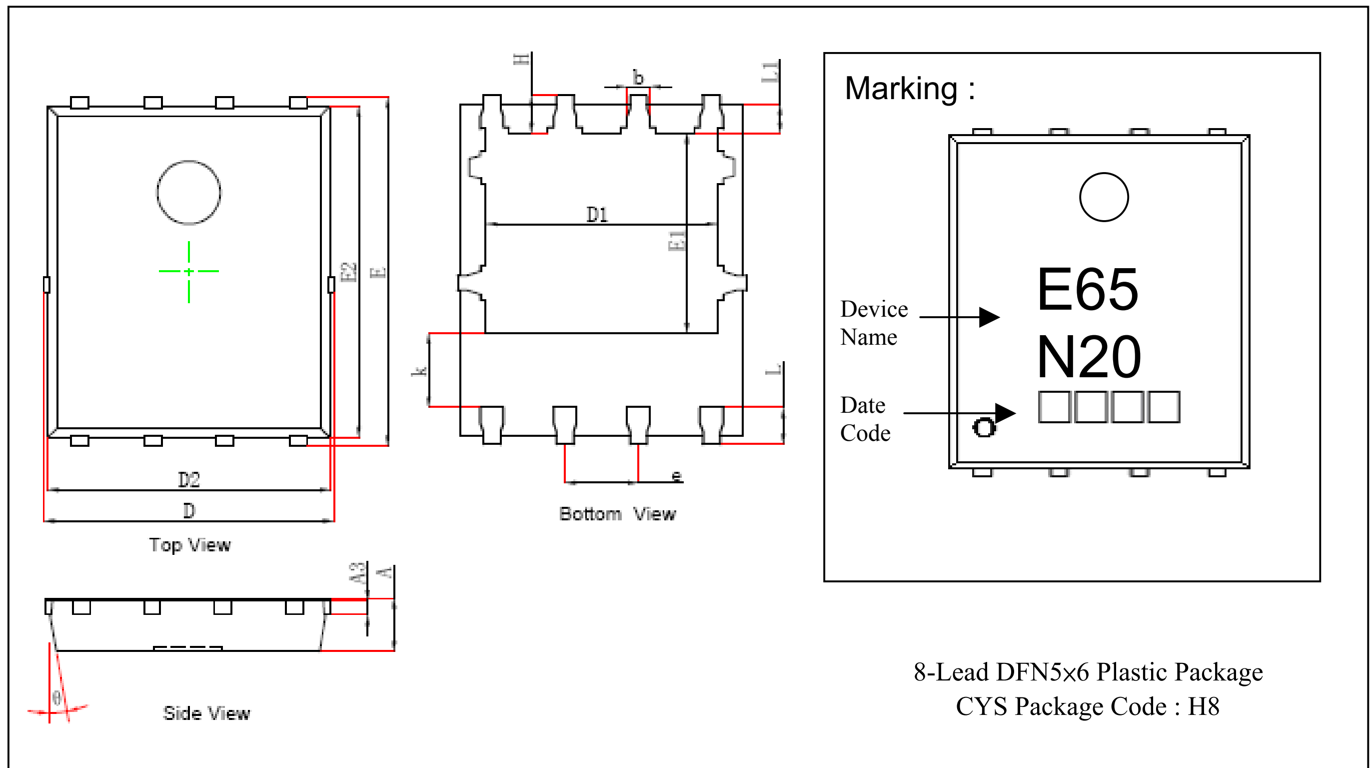
Recommended temperature profile for IR reflow



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

DFN5×6 Dimension



8-Lead DFN5x6 Plastic Package
CYS Package Code : H8

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039	k	1.190	1.390	0.047	0.055
A3	0.254 REF		0.010 REF		b	0.350	0.450	0.014	0.018
D	4.944	5.096	0.195	0.201	e	1.270 TYP.		0.050 TYP.	
E	5.974	6.126	0.235	0.241	L	0.559	0.711	0.022	0.028
D1	3.910	4.110	0.154	0.162	L1	0.424	0.576	0.017	0.023
E1	3.375	3.575	0.133	0.141	H	0.574	0.726	0.023	0.029
D2	4.824	4.976	0.190	0.196	θ	10°	12°	10°	12°
E2	5.674	5.826	0.223	0.229					

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

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

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