N-Channel Enhancement Mode Power MOSFET

MTE020N10BRV8

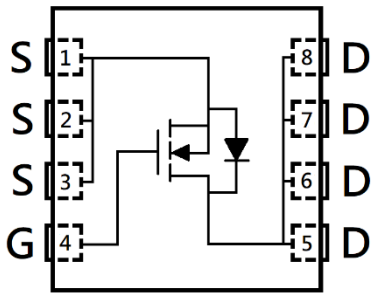
Features

- Single Drive Requirement
- Low On Resistance
- Fast Switching Characteristic

BV_{DSS}	100V
I_D@V_{GS}=10V, T_C=25˚C	14A
I_D@V_{GS}=10V, T_A=25˚C	5.5A
$R_{DS(ON)}$ typ. @ V_{GS}=10V, I_D=7A	25mΩ

Equivalent Circuit

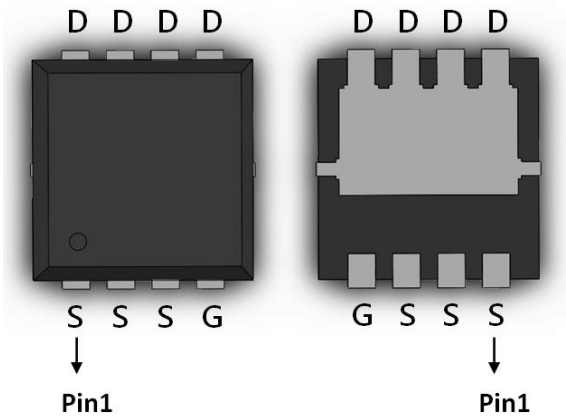
MTE020N10BRV8



G : Gate S : Source D : Drain

Outline

DFN3x3



Ordering Information

Device	Package	Shipping
MTE020N10BRV8-0-T6-G	DFN3x3 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

- Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products
- Packing spec, T6 : 3000 pcs / tape & reel,13” reel
- Product rank, zero for no rank products
- Product name

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (silicon limit)	*a	I_D	20	A
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (package limit)	*a		14	
Continuous Drain Current @ V_{GS}=10V, T_C=100°C	*a		13	
Continuous Drain Current @ V_{GS}=10V, T_A=25°C	*b		5.5	
Continuous Drain Current @ V_{GS}=10V, T_A=70°C	*b		4.4	
Pulsed Drain Current	*c	I_{DM}	56	
Continuous Body Diode Forward Current @ T_C=25°C	*a	I_S	14	
Pulsed Body Diode Forward Current @ T_C=25°C	*a	I_{SM}	56	
Avalanche Current @ L=0.1mH		I_{AS}	15	
Avalanche Energy @ L=0.5mH		E_{AS}	16	mJ
Total Power Dissipation	T_C=25°C *a	P_D	28	W
	T_C=100°C *a		11	
	T_A=25°C *b		2.2	
	T_A=70°C *b		1.4	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	°C

Thermal Data

Parameter		Symbol	Steady State	Unit
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	4.5	°C/W
Thermal Resistance, Junction-to-ambient	*b	$R_{\theta JA}$	58	

Note:

*a. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

*b. 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_D 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.

*c. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

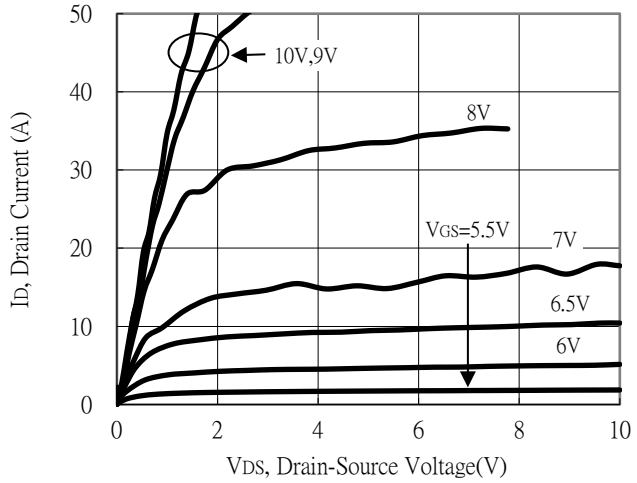
Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	100	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	2	-	4		V_{DS}=V_{GS}, I_D=250μA
G_{FS}	-	6.9	-	S	V_{DS}=10V, I_D=7A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=80V, V_{GS}=0V
$R_{DS(ON)}$	-	25	35	mΩ	V_{GS}=10V, I_D=7A
Dynamic					
Ciss	-	830	-	pF	V_{DS}=50V, V_{GS}=0V, f=1MHz
Coss	-	108	-		
Crss	-	16	-		
Rg	-	1.3	-	Ω	f=1MHz
Qg *1, 2	-	13	-	nC	V_{DS}=50V, I_D=7A, V_{GS}=10V
Qgs *1, 2	-	6	-		
Qgd *1, 2	-	2.9	-		
$t_{d(ON)}$ *1, 2	-	14	-	ns	V_{DS}=50V, I_D=7A, V_{GS}=10V, R_{GS}=3Ω
tr *1, 2	-	15	-		
$t_{d(OFF)}$ *1, 2	-	17	-		
t_f *1, 2	-	5.9	-		
Source-Drain Diode					
V_{SD} *1	-	0.84	1.2	V	I_S=7A, V_{GS}=0V
trr	-	32	-	ns	I_F=20A, dI_F/dt=100A/μs
Qrr	-	48	-	nC	

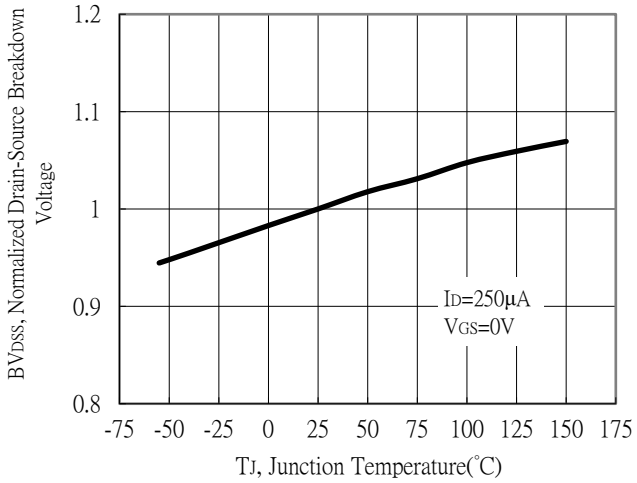
Note:
*1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2. Independent of operating temperature

Typical Characteristics

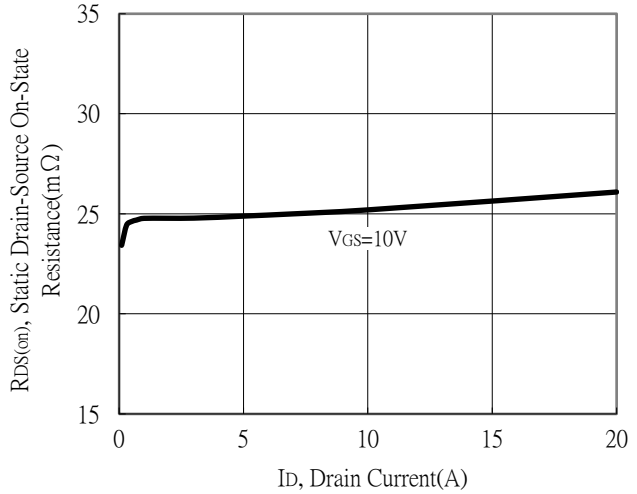
Typical Output Characteristics



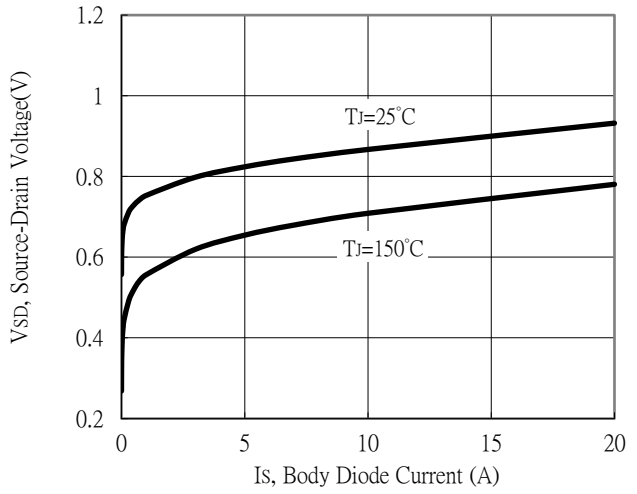
Breakdown Voltage vs Ambient Temperature



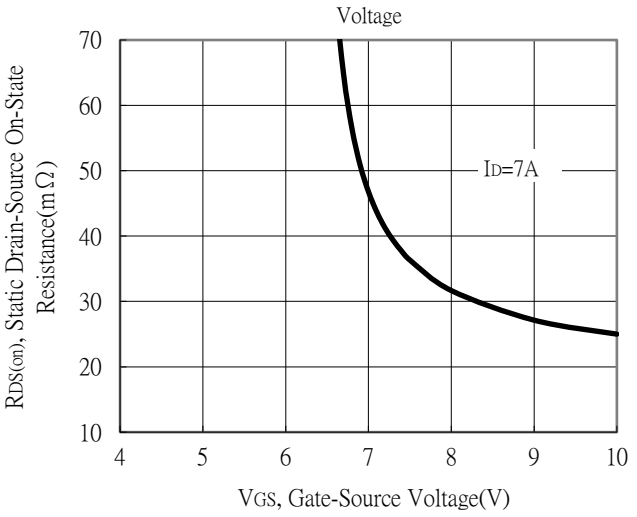
Static Drain-Source On-State resistance vs Drain Current



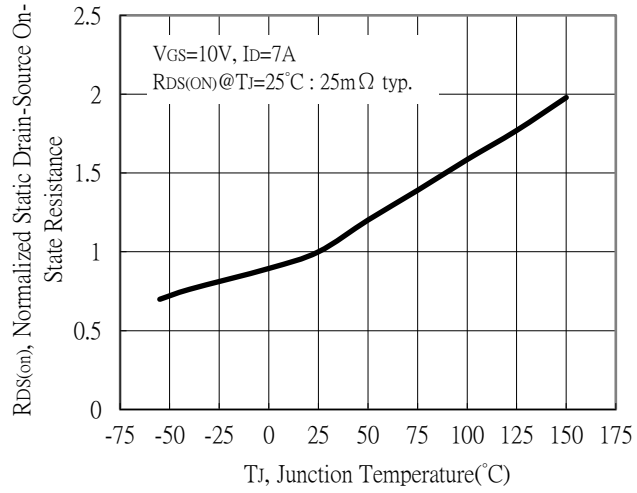
Body Diode Current vs Source-Drain Voltage



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

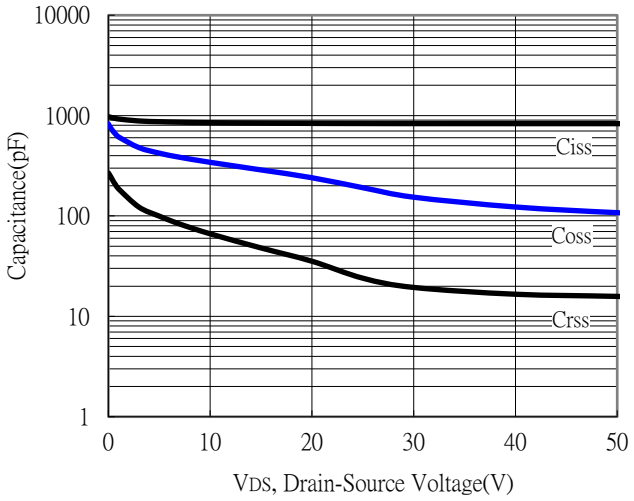


Drain-Source On-State Resistance vs Junction Temperature

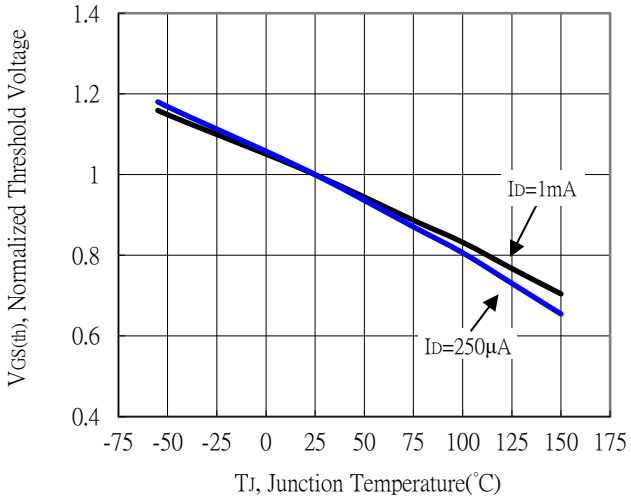


Typical Characteristics (Cont.)

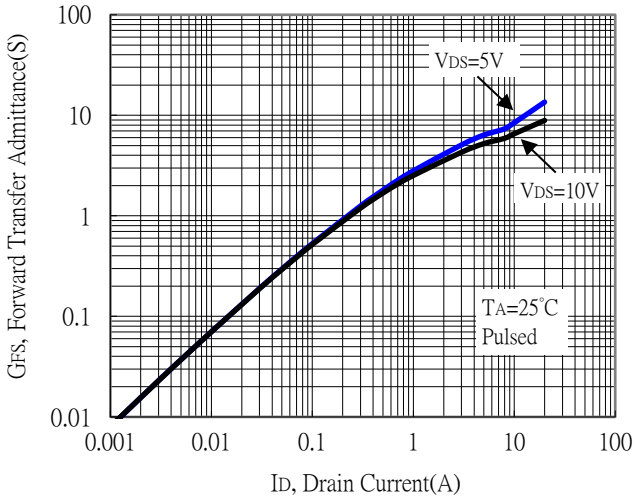
Capacitance vs Drain-to-Source Voltage



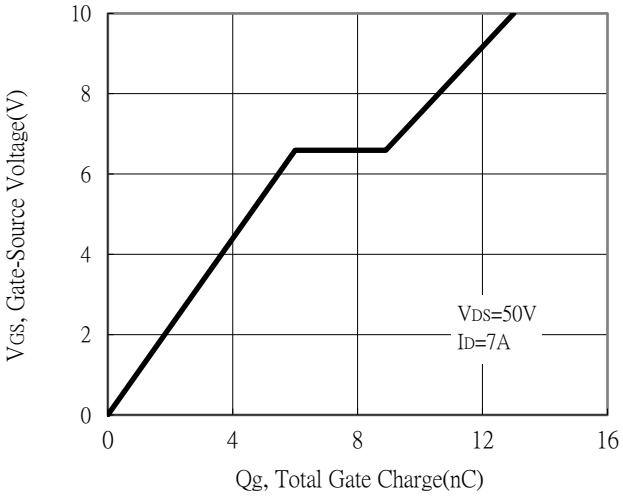
Threshold Voltage vs Junction Temperature



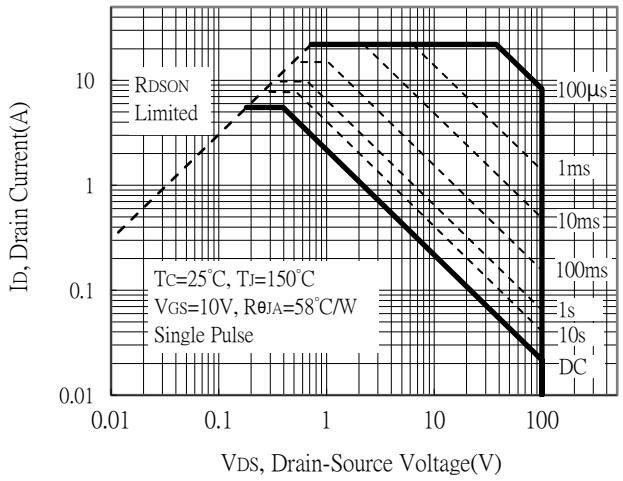
Forward Transfer Admittance vs Drain Current



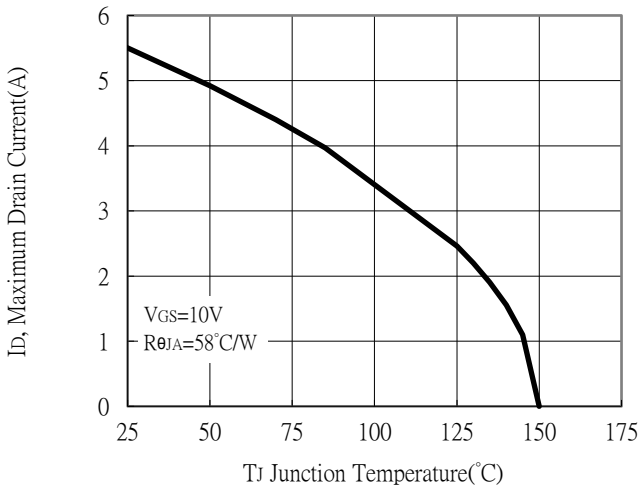
Gate Charge Characteristics



Maximum Safe Operating Area

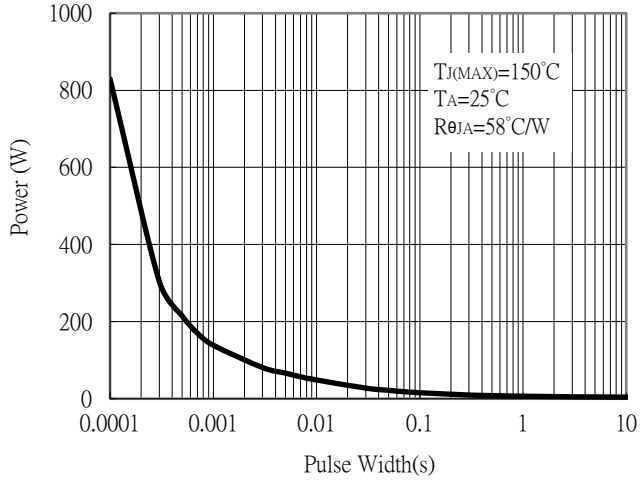


Maximum Drain Current vs Junction Temperature

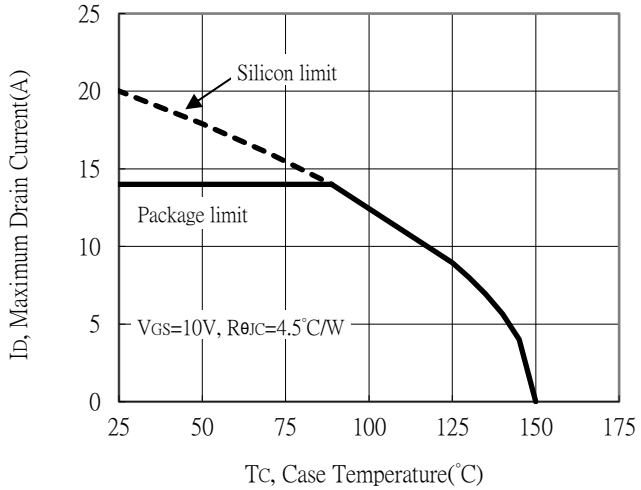


Typical Characteristics (Cont.)

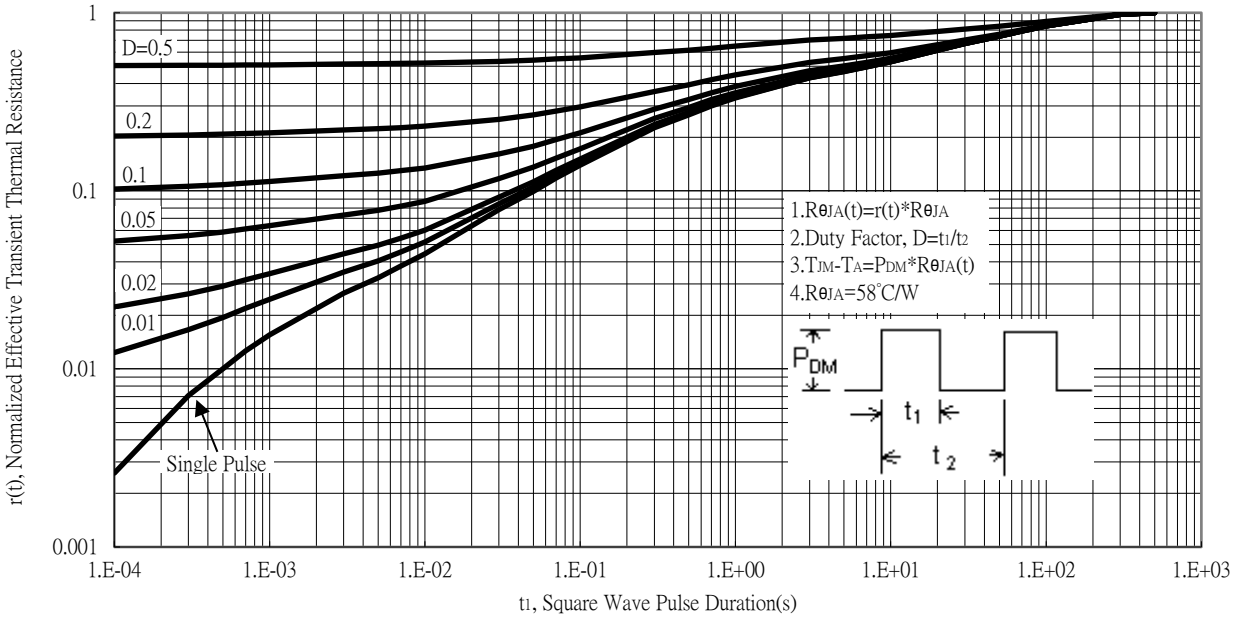
Single Pulse Power Rating, Junction to Ambient



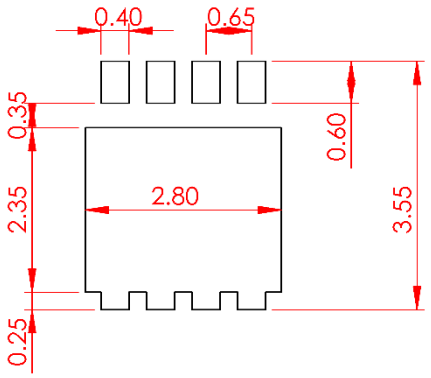
Maximum Drain Current vs Case Temperature



Transient Thermal Response Curves

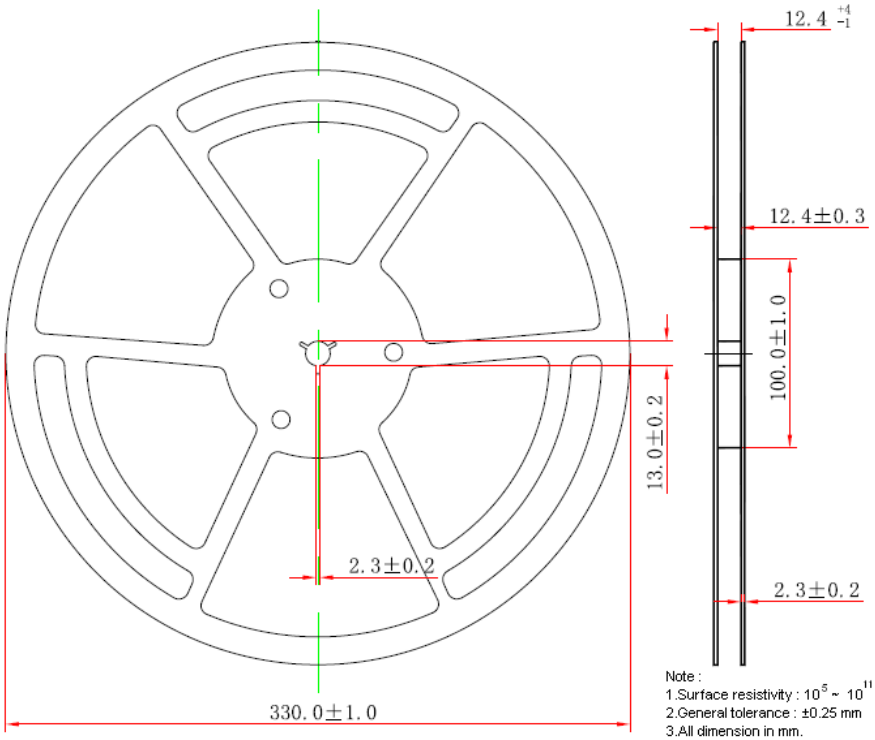


Recommended Soldering Footprint



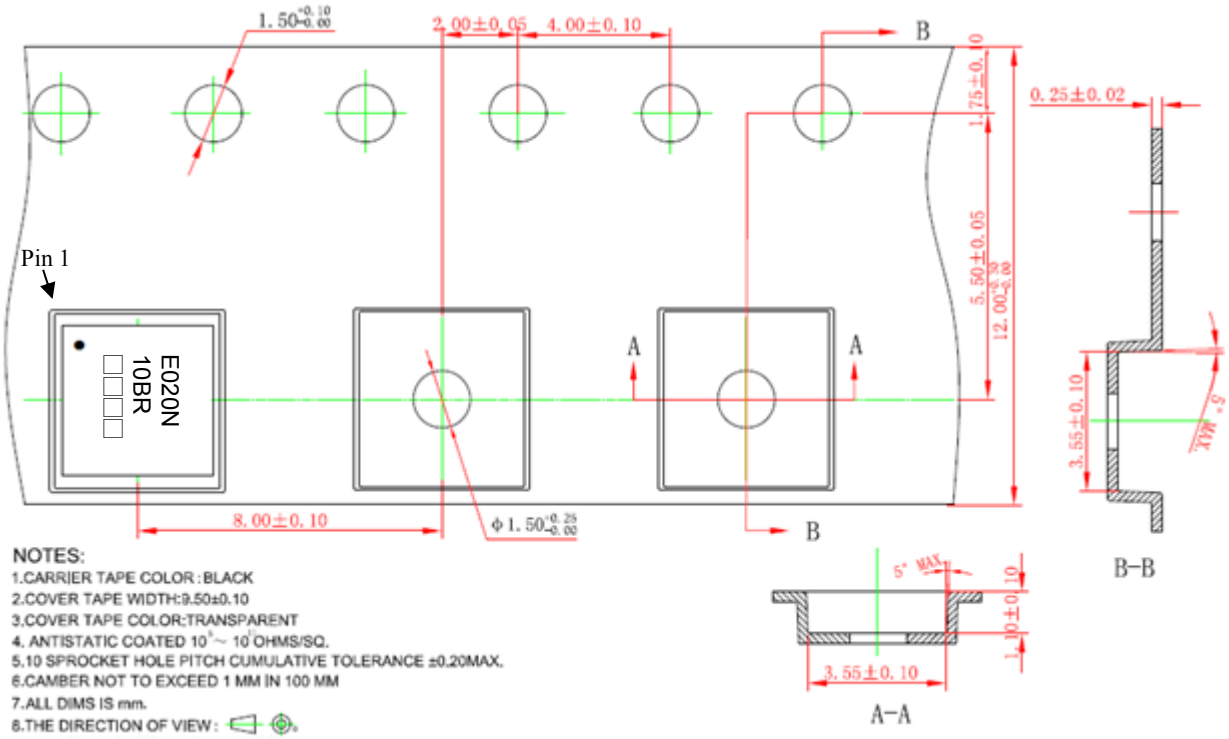
unit : mm

Reel Dimension



Note :
1.Surface resistivity : 10^{5} ~ 10^{11} ohm/sq
2.General tolerance : ±0.25 mm
3.All dimension in mm.

Carrier Tape Dimension

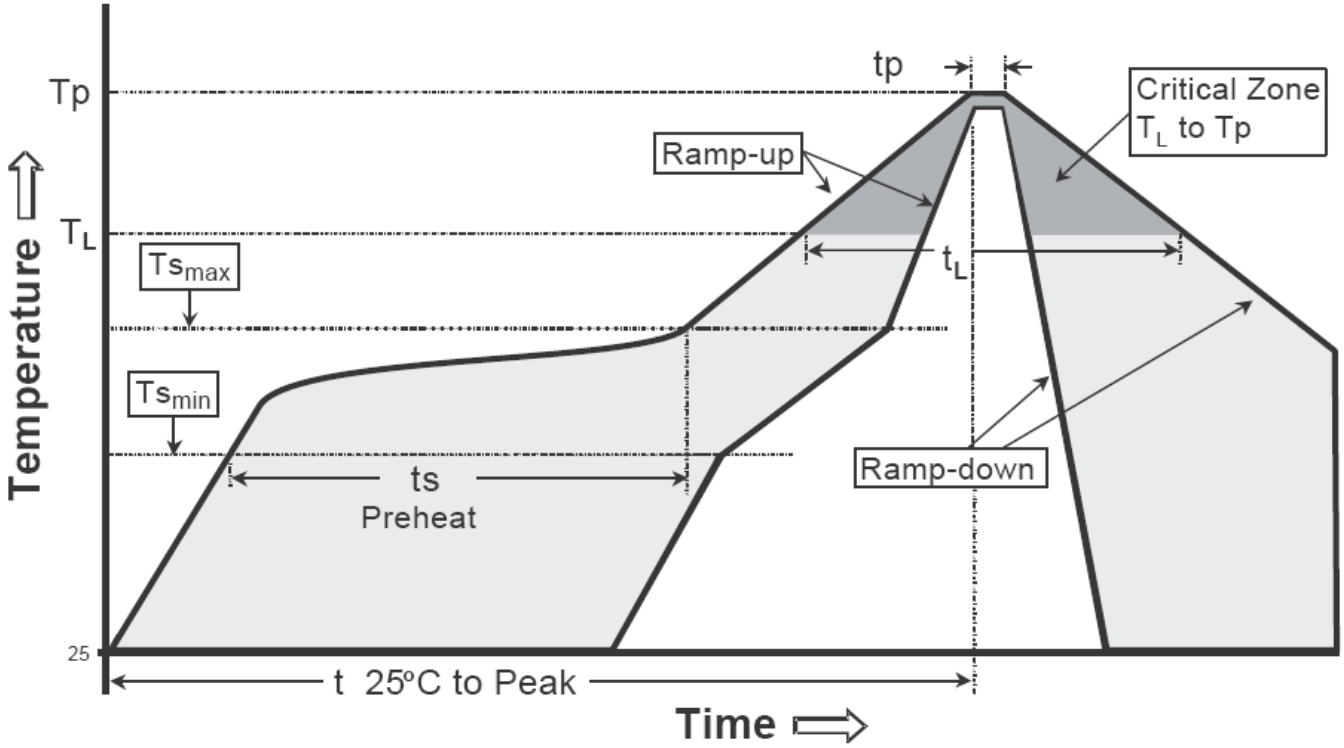


NOTES:
1.CARRIER TAPE COLOR : BLACK
2.COVER TAPE WIDTH:9.50±0.10
3.COVER TAPE COLOR:TRANSPARENT
4. ANTISTATIC COATED 10^{5} ~ 10^{11} OHMS/SQ.
5.10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.20MAX.
6.CAMBER NOT TO EXCEED 1 MM IN 100 MM
7.ALL DIMS IS mm.
8.THE DIRECTION OF VIEW :

Recommended wave soldering condition

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

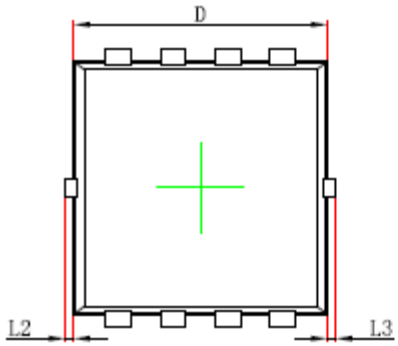
Recommended temperature profile for IR reflow



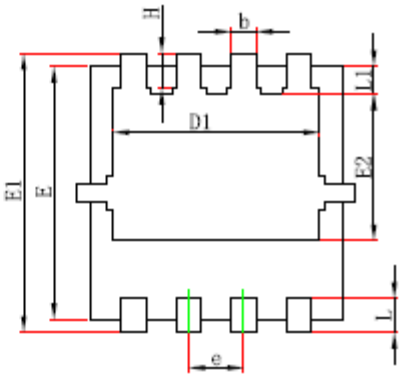
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T_P)	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.

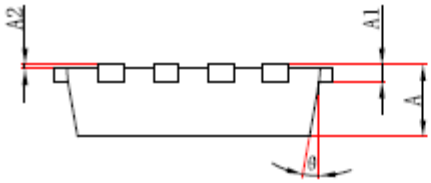
DFN3×3 Dimension



Top View



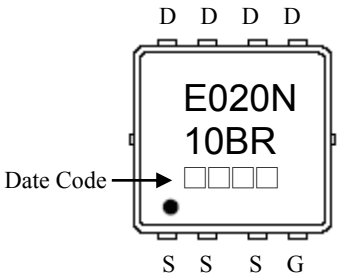
Bottom View



Side View

8-Lead DFN3×3 Plastic Package
CYStek Package Code: V8

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 : production serial number, 01~99

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.026	0.033	0.650	0.850	b	0.008	0.016	0.200	0.400
A1	0.006	REF	0.152	REF	e	0.022	0.030	0.550	0.750
A2	0.000	0.002	0.000	0.050	L	0.012	0.020	0.300	0.500
D	0.114	0.122	2.900	3.100	L1	0.007	0.019	0.180	0.480
D1	0.091	0.102	2.300	2.600	L2	0.000	0.004	0.000	0.100
E	0.114	0.122	2.900	3.100	L3	0.000	0.004	0.000	0.100
E1	0.124	0.136	3.150	3.450	H	0.012	0.020	0.315	0.515
E2	0.060	0.076	1.535	1.935	θ	9°	13°	9°	13°

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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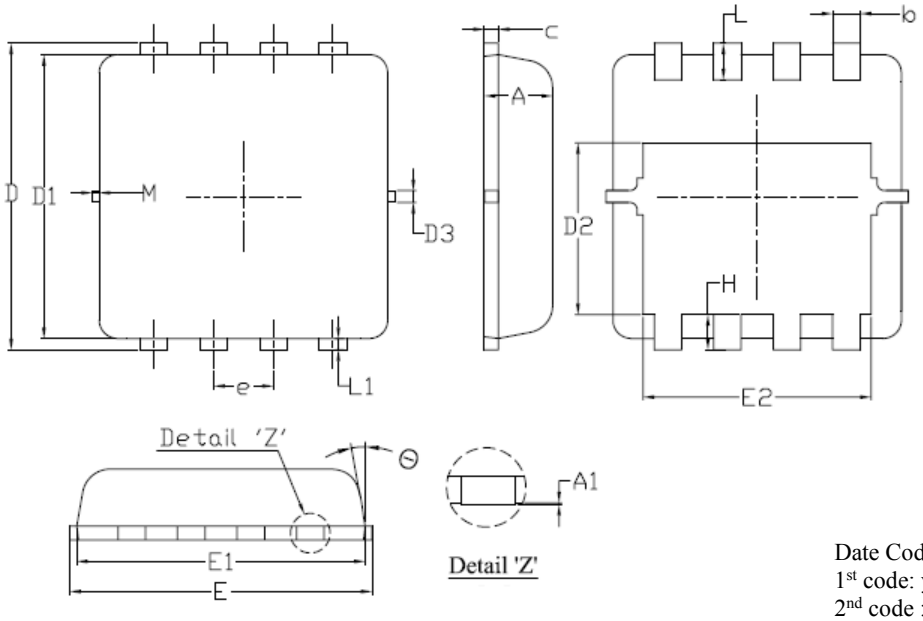
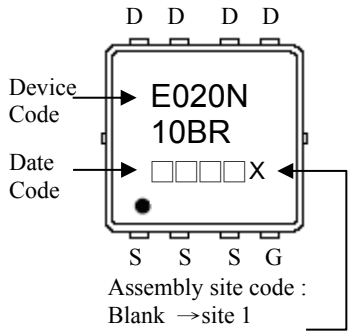
DFN3x3 Dimension (G forming)



8-Lead DFN3x3 Plastic Package
CYStek Package Code: V8

Marking:



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3rd and 4th codes : production serial number, 01~99

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.70	0.80	0.028	0.031	E1	3.00	3.20	0.118	0.126
A1	0.00	0.05	0.000	0.002	E2	2.39	2.59	0.094	0.102
b	0.25	0.35	0.010	0.014	e	0.65	BSC	0.026	BSC
c	0.10	0.25	0.004	0.010	H	0.30	0.50	0.012	0.020
D	3.25	3.45	0.128	0.136	L	0.30	0.50	0.012	0.020
D1	3.00	3.20	0.118	0.126	L1	0.13	TYP	0.005	TYP
D2	1.78	1.98	0.070	0.078	θ	-	12°	-	12°
D3	0.13	TYP	0.005	TYP	M	-	0.15	-	0.005
E	3.00	3.40	0.118	0.134					

Notes: 1.Controlling dimension: millimeters.
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Material:

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

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