N-CHANNEL ENHANCEMENT MODE POWER MOSFET

MTNN20N03Q8

	N-CH 1	N-CH 2
BV_{DSS}	30V	60V
I_D	8A	0.115A
$R_{DSON(MAX)}$	20mΩ	5Ω

Description

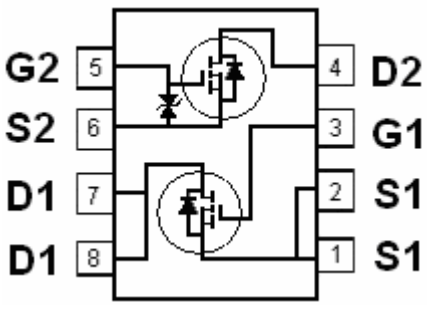
The MTNN20N03Q8 provides the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness.
The SOP-8 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

Features

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Two N-ch MOSFETs in a package
- Pb-free lead plating package

Equivalent Circuit

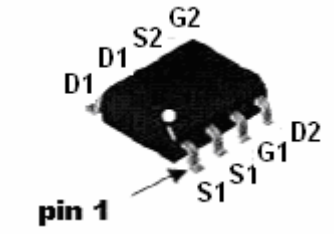
MTNN20N03Q8



G：Gate
S：Source
D：Drain

Outline

SOP-8



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits		Unit
		N-CH 1	N-CH 2	
Drain-Source Voltage	V_{DS}	30	60	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current @ T_C=25 °C (Note 1)	I_D	8	0.115	A
Continuous Drain Current @ T_C=100 °C (Note 1)	I_D	6	0.08	A
Pulsed Drain Current (Note 2&3)	I_{DM}	32	0.7	A
Total Power Dissipation @ T_A=25 °C	Pd	2	0.4	W
Linear Derating Factor		0.016	0.016	W / °C
ESD susceptibility (Note 4)			1250	V
Operating Junction Temperature	Tj	-55~+150		°C
Storage Temperature	Tstg	-55~+150		°C
Thermal Resistance, Junction-to-Ambient (Note 1)	Rth,ja	62.5		°C/W

Note : 1. Surface mounted on 1 in² copper pad of FR-4 board; 135°C/W when mounted on minimum copper pad.
2. Pulse width limited by maximum junction temperature.
3. Pulse width≤300μs, duty cycle≤2%.
4. Human body model, 1.5kΩ in series with 100pF

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

N-Channel MOSFET 1

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	30	-	-	V	V_{GS}=0, ID=250μA
$V_{GS(th)}$	1.0	1.5	3.0	V	V_{DS} = V_{GS}, I_D=250μA
G_{FS}	-	16	-	S	V_{DS} =5V, I_D=8A
I_{GSS}	-	-	±100	nA	V_{GS}=±20
I_{DSS}	-	-	1	μA	V_{DS} =24V, V_{GS} =0
	-	-	25		V_{DS} =20V, V_{GS} =0, Tj=125°C
*$R_{DS(ON)}$	-	15.5	20	mΩ	V_{GS} =10V, I_D=8A
	-	23	31		V_{GS} =5V, I_D=6A
Dynamic					
*Qg(V_{GS}=10V)	-	11	-	nC	I_D=8A, V_{DS}=15V, V_{GS}=10V
*Qg(V_{GS}=5V)	-	6	-		
*Qgs	-	1.2	-		
*Qgd	-	3.3	-		
*$td_{(ON)}$	-	11	-	ns	V_{DS}=15V, I_D=1A,V_{GS}=10V, R_G=6Ω
*tr	-	16	-		
*$td_{(OFF)}$	-	36	-		
*tf	-	20	-		
Ciss	-	1115	-	pF	V_{GS}=0V, V_{DS}=15V, f=1MHz
Coss	-	116	-		
Crss	-	82	-		
Rg	-	2	-	Ω	V_{GS}=15mV, V_{DS}=0V, f=1MHz

Source-Drain Diode					
*I_S	-	-	2.3	A	
*I_{SM}	-	-	9.2		
*V_{SD}	-	-	1.2	V	I_F=I_S, V_{GS}=0V
*trr	-	50	-	ns	I_F=I_S, V_{GS}=0, dI/dt=100A/μs
*Qrr	-	2	-	nC	

N-Channel MOSFET 2

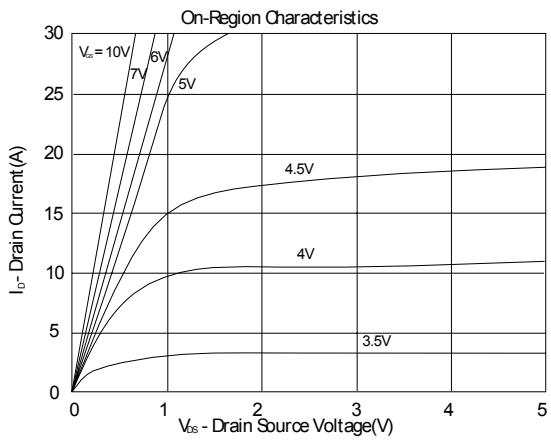
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}*	60	-	-	V	V_{GS}=0, I_D=10μA
$V_{GS(th)}$	1	-	2.5	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±10	μA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=60V, V_{GS}=0
$R_{DS(ON)}$*	-	3.6	5.5	Ω	I_D=100mA, V_{GS}=5V
	-	3	5		I_D=100mA, V_{GS}=10V
G_{FS}	100	-	-	mS	V_{DS}=10V, I_D=100mA
C_{iss}	-	30.5	-	pF	V_{DS}=10V, V_{GS}=0, f=1MHz
C_{oss}	-	9.3	-		
C_{rss}	-	5.9	-		

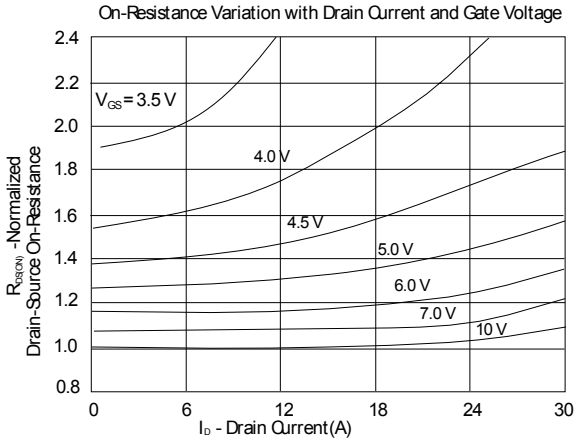
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

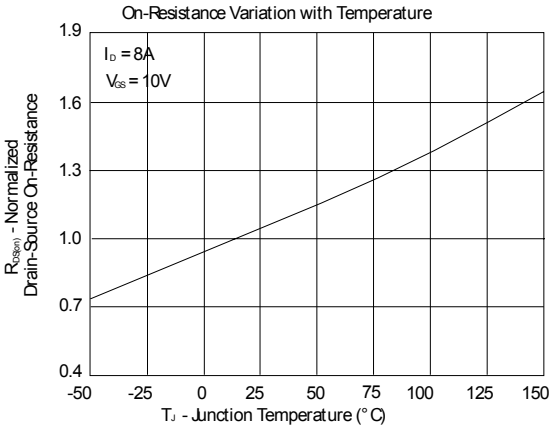
Ordering Information

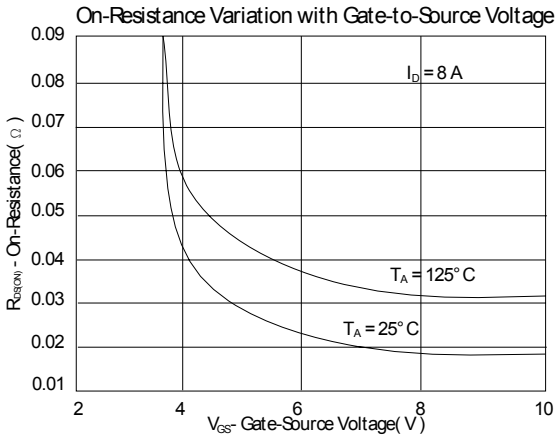
Device	Package	Shipping
MTNN20N03Q8	SOP-8 (Pb-free lead plating package)	3000 pcs / Tape & Reel

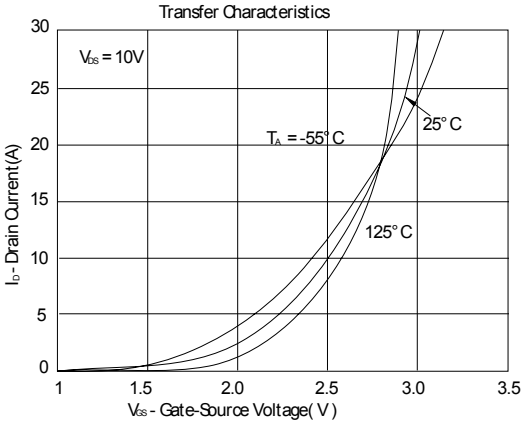
Typical Characteristics
N-CH MOSFET 1

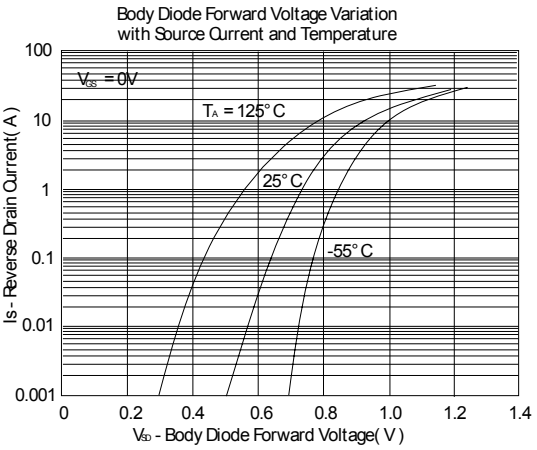


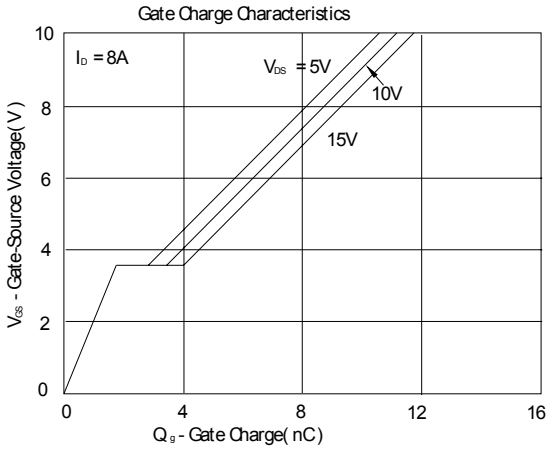


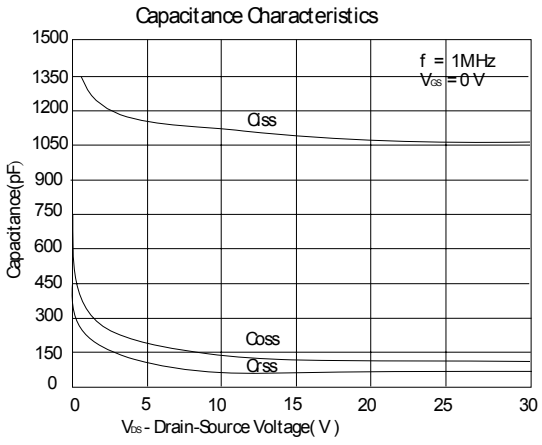

On-Resistance Variation with Temperature
I_D = 8A
V_{GS} = 10V
$R_{DS(on)}$ - Normalized Drain-Source On-Resistance
T_J - Junction Temperature (°C)

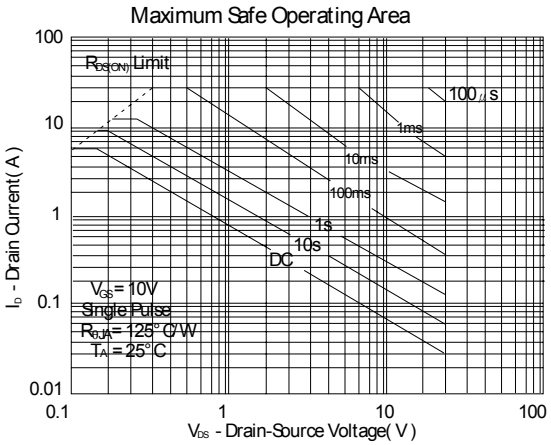

On-Resistance Variation with Gate-to-Source Voltage
I_D = 8 A
T_A = 125°C
T_A = 25°C
$R_{DS(ON)}$ - On-Resistance(Ω)
V_{GS}- Gate-Source Voltage(V)

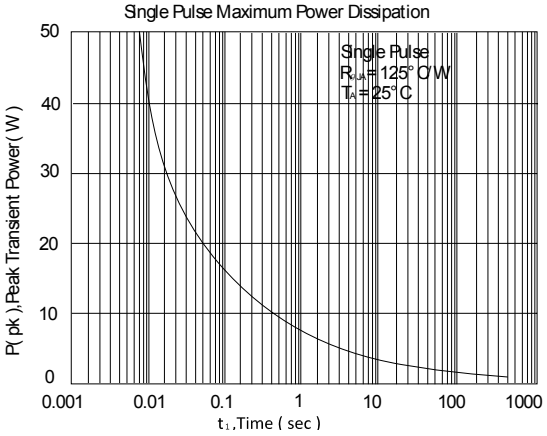

Transfer Characteristics
V_{DS} = 10V
T_A = -55°C
25°C
125°C
I_D - Drain Current(A)
V_{GS} - Gate-Source Voltage(V)


Body Diode Forward Voltage Variation
with Source Current and Temperature
V_{GS} = 0V
T_A = 125°C
25°C
-55°C
Is - Reverse Drain Current(A)
V_{SD} - Body Diode Forward Voltage(V)

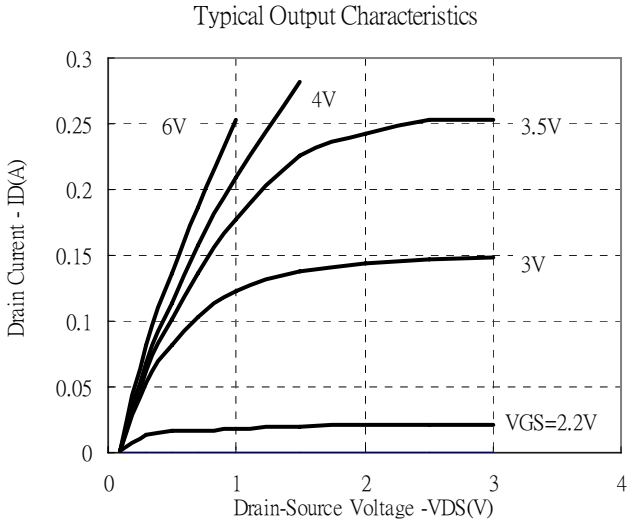

Gate Charge Characteristics
I_D = 8A
V_{DS} = 5V
10V
15V
V_{GS} - Gate-Source Voltage(V)
Q_g - Gate Charge(nC)

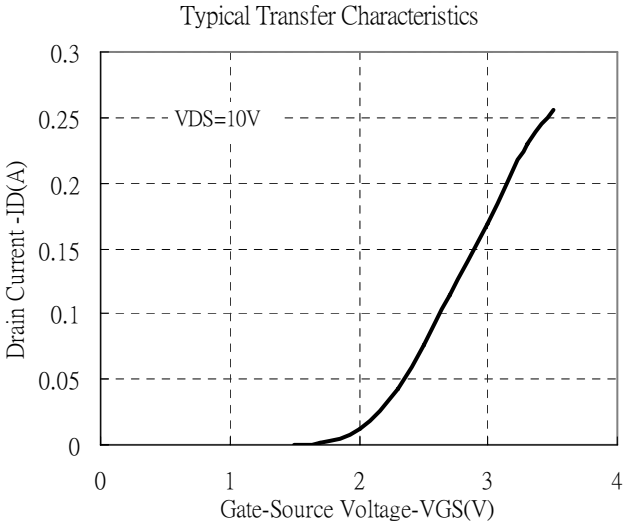

Capacitance Characteristics
f = 1MHz
V_{GS} = 0 V
Ciss
Coss
Crss
Capacitance(pF)
V_{DS} - Drain-Source Voltage(V)

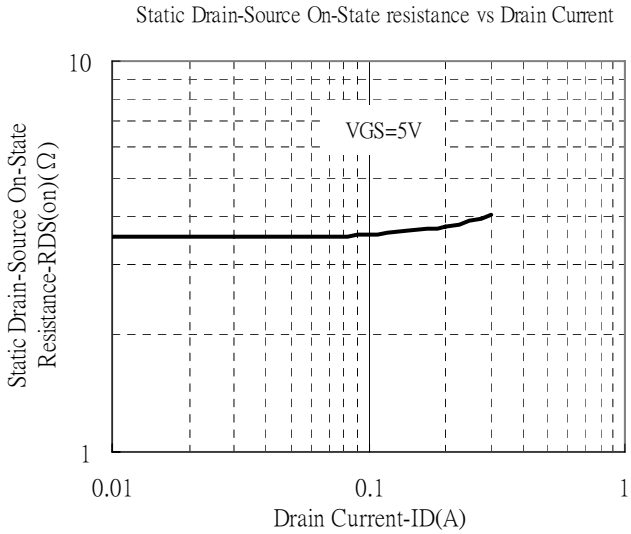

Maximum Safe Operating Area
$R_{DS(ON)}$ Limit
100μs
1ms
10ms
100ms
1s
10s
DC
V_{GS}=10V
Single Pulse
$R_{\theta JA}$=125°C/W
T_A=25°C
I_D - Drain Current(A)
V_{DS} - Drain-Source Voltage(V)

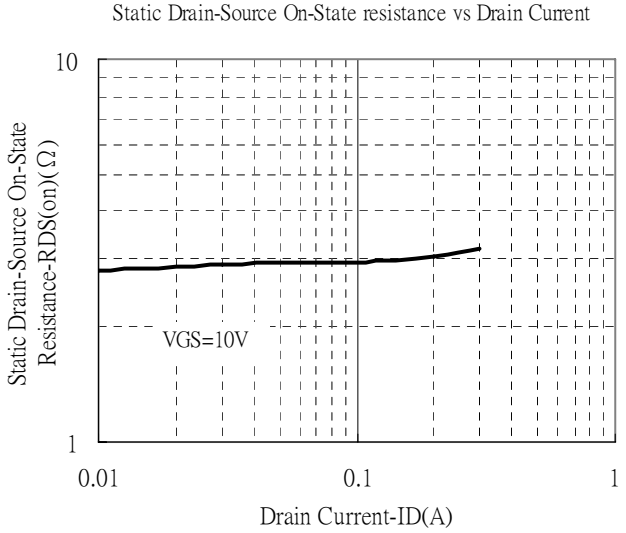

Single Pulse Maximum Power Dissipation
Single Pulse
$R_{\theta JA}$=125°C/W
T_A=25°C
P(pk),Peak Transient Power(W)
t_1,Time (sec)

N-CH MOSFET 2

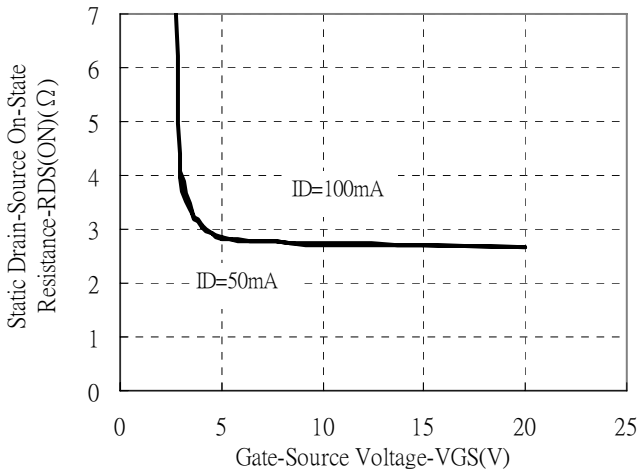

Typical Output Characteristics
6V
4V
3.5V
3V
VGS=2.2V
Drain Current - ID(A)
Drain-Source Voltage -VDS(V)


Typical Transfer Characteristics
VDS=10V
Drain Current -ID(A)
Gate-Source Voltage-VGS(V)

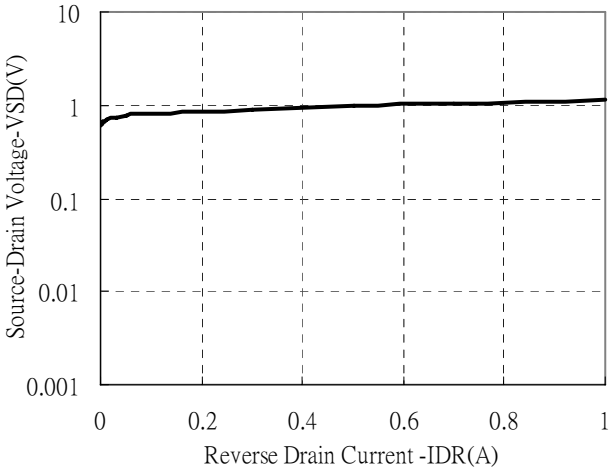

Static Drain-Source On-State resistance vs Drain Current
VGS=5V
Static Drain-Source On-State Resistance-RDS(on)(Ω)
Drain Current-ID(A)


Static Drain-Source On-State resistance vs Drain Current
VGS=10V
Static Drain-Source On-State Resistance-RDS(on)(Ω)
Drain Current-ID(A)

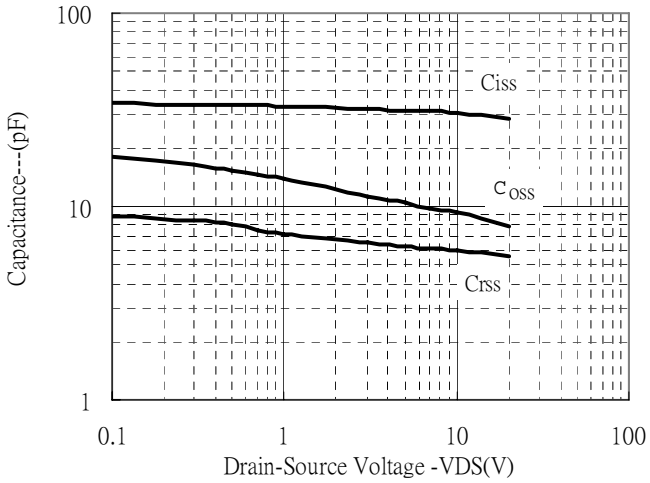
Static Drain-Source On-State Resistance vs Gate-Source Voltage



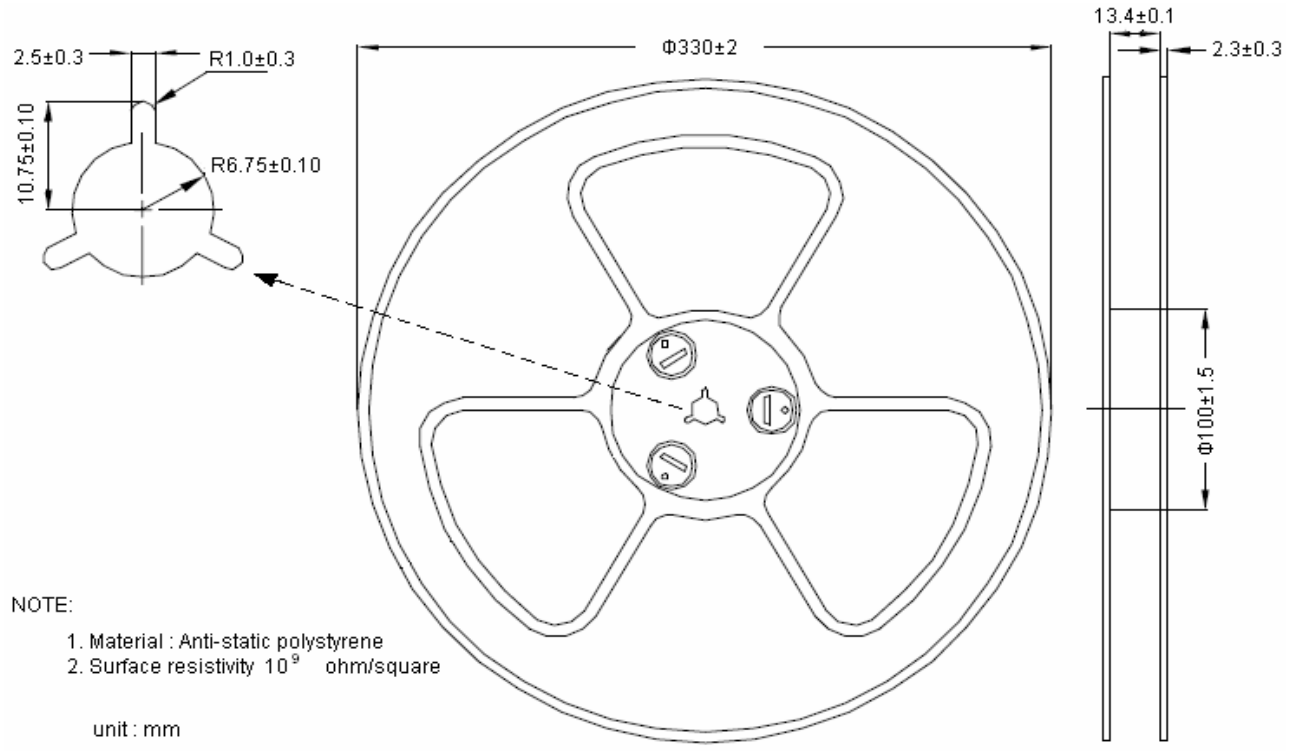
Reverse Drain Current vs Source-Drain Voltage



Capacitance vs Drain-to-Source Voltage



Reel Dimension

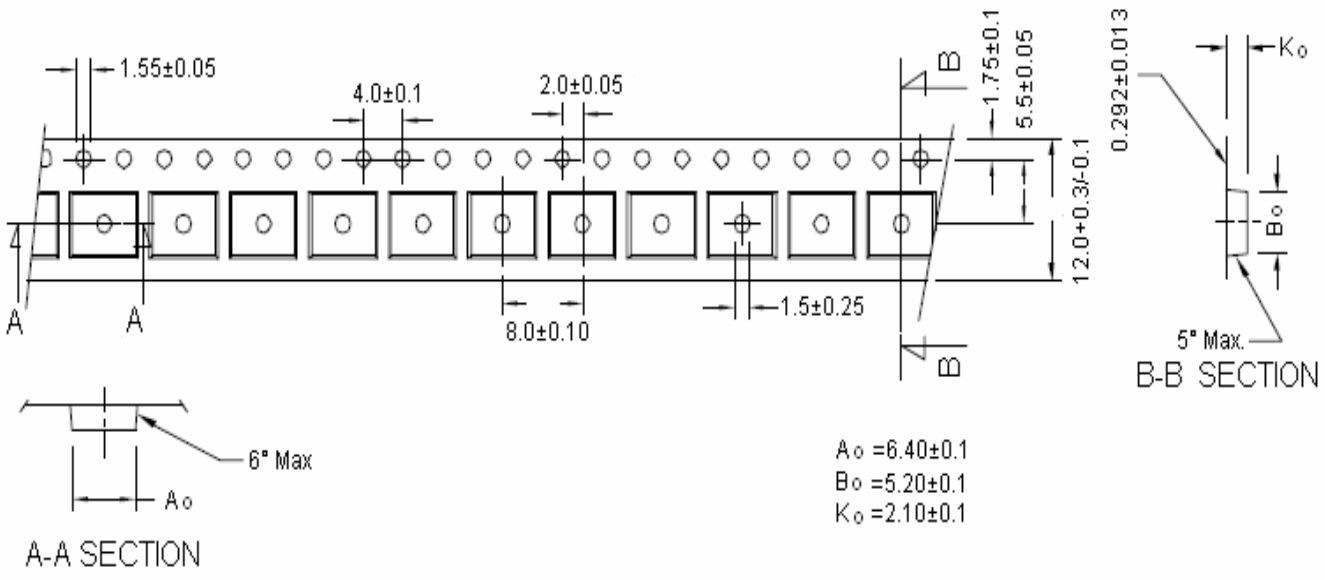


NOTE:

1. Material : Anti-static polystyrene
2. Surface resistivity 10^9 ohm/square

unit : mm

Carrier Tape Dimension



Notes:

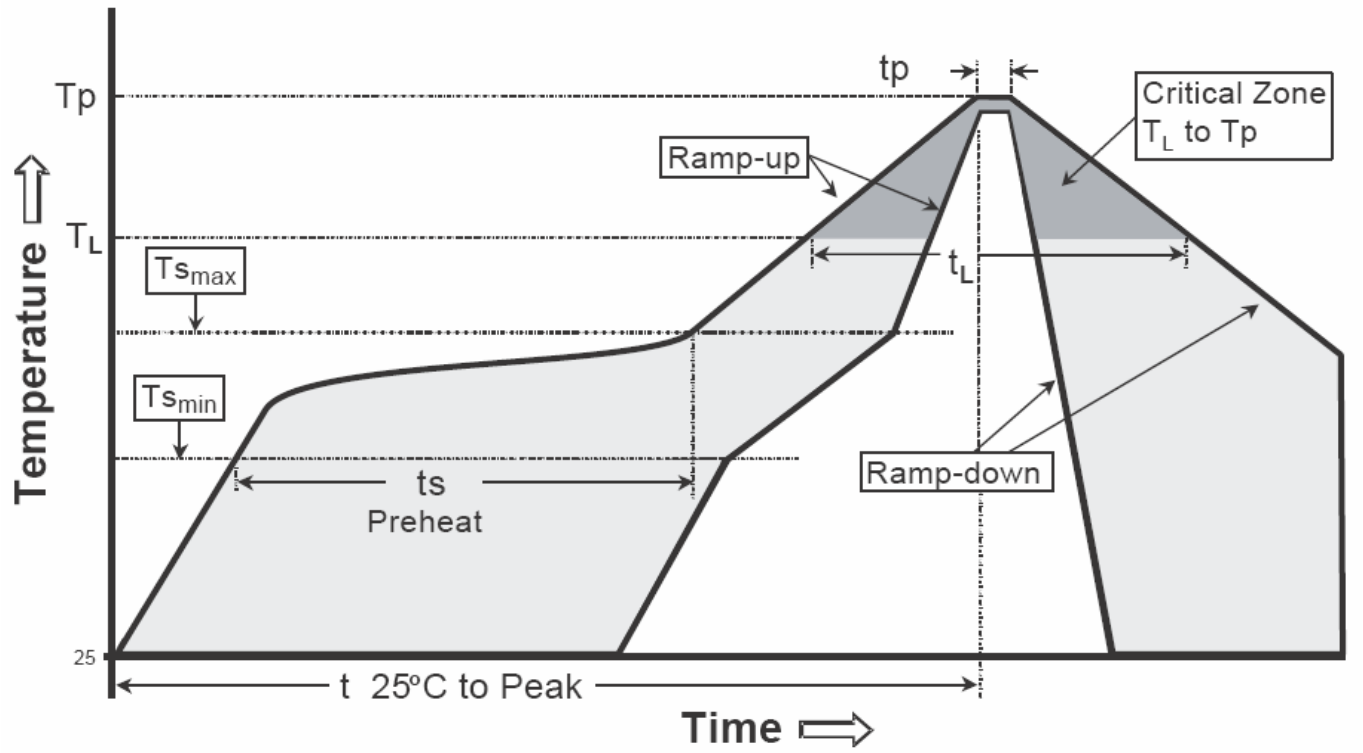
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Uni : millimeter

Recommended wave soldering condition

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

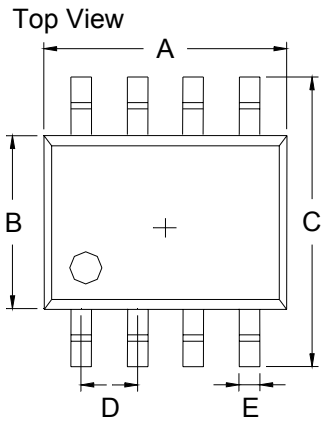
Recommended temperature profile for IR reflow

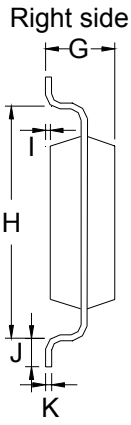


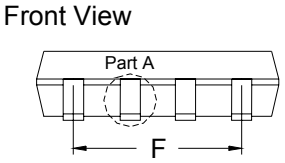
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature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

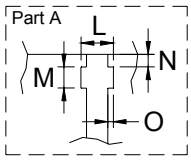
Note : All temperatures refer to topside of the package, measured on the package body surface.

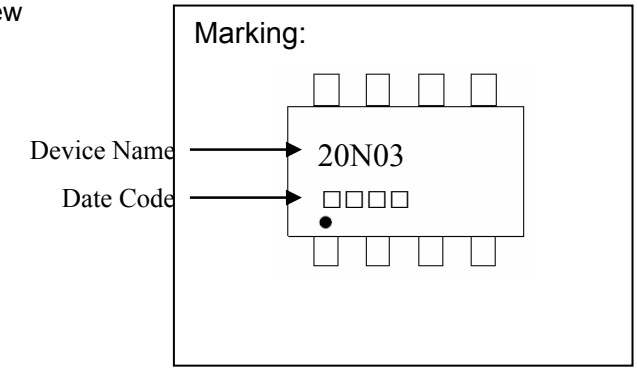
SOP-8 Dimension











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

*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1890	0.2007	4.80	5.10	I	0.0098	REF	0.25	REF
B	0.1496	0.1654	3.80	4.20	J	0.0118	0.0354	0.30	0.90
C	0.2283	0.2441	5.80	6.20	K	0.0074	0.0098	0.19	0.25
D	0.0480	0.0519	1.22	1.32	L	0.0145	0.0204	0.37	0.52
E	0.0138	0.0193	0.35	0.49	M	0.0118	0.0197	0.30	0.50
F	0.1472	0.1527	3.74	3.88	N	0.0031	0.0051	0.08	0.13
G	0.0531	0.0689	1.35	1.75	O	0.0000	0.0059	0.00	0.15
H	0.1889	0.2007	4.80	5.10					

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.