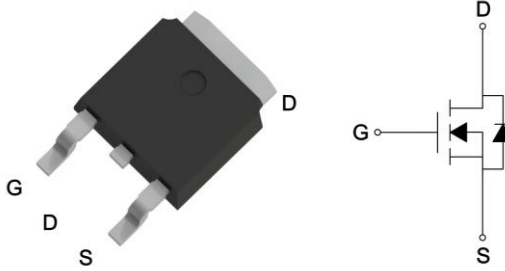


## Product Summary

$BV_{DSS}$	200	V
$R_{DS(ON)}$ typ. @ $V_{GS}=10V, I_D=3A$	125	mΩ
$R_{DS(ON)}$ typ. @ $V_{GS}=4.5V, I_D=2A$	130	
$I_D$ @ $V_{GS}=10V, T_C=25^\circ C$	14	A
$I_D$ @ $V_{GS}=10V, T_A=25^\circ C$	3	

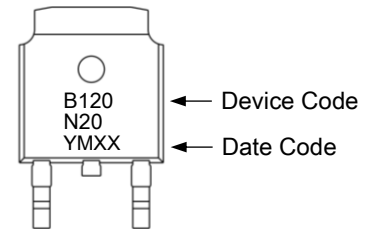
## TO-252



## Features

- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free

## Marking



YMXX: Date Code Marking

Y: Year Code, the last digit of Christian year

M: Month Code

A: Jan	B: Feb	C: Mar	D: Apr	E: May	F: Jun
G: Jul	H: Aug	J: Sep	K: Oct	L: Nov	M: Dec

XX: Production Serial Number, 01~99

## Ordering Information

Device	Package	Shipping
MTB120N20J3-0-T3-G	TO-252	2500pcs / Tape & Reel

0: Product rank, zero for no rank products.

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

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

## Absolute Maximum Ratings ( $T_A=25^\circ C$ )

Parameter	Symbol	Value	Unit	
Drain-Source Voltage	$V_{DS}$	200	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current @ $V_{GS}=10V, T_C=25^\circ C$	$I_D$	14	A	
Continuous Drain Current @ $V_{GS}=10V, T_C=100^\circ C$		9		
Continuous Drain Current @ $V_{GS}=10V, T_A=25^\circ C$		3		
Continuous Drain Current @ $V_{GS}=10V, T_A=70^\circ C$		2.4		
Pulsed Drain Current	$I_{DM}$	30		
Continuous Body Diode Forward Current @ $T_C=25^\circ C$	$I_S$	14		
Pulsed Body Diode Forward Current @ $T_C=25^\circ C$	$I_{SM}$	30		
Avalanche Current @ $L=0.1mH$	$I_{AS}$	5		
Avalanche Energy @ $L=0.5mH$	$E_{AS}$	6	mJ	
Total Power Dissipation	$P_D$	$T_C=25^\circ C$	74	W
		$T_C=100^\circ C$	30	
		$T_A=25^\circ C$	3.6	
		$T_A=70^\circ C$	2.3	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150	$^\circ C$	
Steady State Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.7	$^\circ C/W$	
Steady State Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	35		



**Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise specified)**

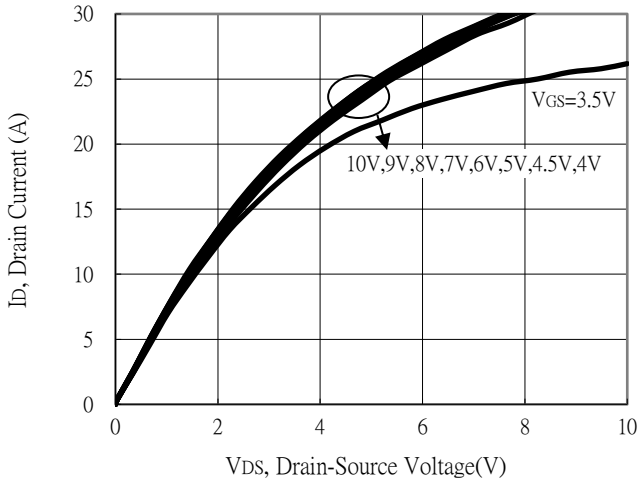
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	200	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1	-	2.5		V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub>	-	10.6	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =3A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =160V, V <sub>GS</sub> =0V
R <sub>DS(ON)</sub>	-	125	163	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =3A
	-	130	182		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A
<b>Dynamic</b>					
C <sub>iss</sub>	-	930	-	pF	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	50	-		
C <sub>rss</sub>	-	28	-		
R <sub>g</sub>	-	2.2	-	Ω	f=1MHz
Q <sub>g</sub> *d,e	-	12	-	nC	V <sub>DS</sub> =100V, I <sub>D</sub> =3A, V <sub>GS</sub> =4.5V
Q <sub>g</sub> *d,e	-	24	-		
Q <sub>gs</sub> *d,e	-	3.1	-		
Q <sub>gd</sub> *d,e	-	6.2	-		
t <sub>d(ON)</sub> *d,e	-	11	-	ns	V <sub>DS</sub> =100V, I <sub>D</sub> =3A, V <sub>GS</sub> =10V, R <sub>GS</sub> =1Ω
t <sub>r</sub> *d,e	-	18	-		
t <sub>d(OFF)</sub> *d,e	-	41	-		
t <sub>f</sub> *d,e	-	14	-		
<b>Source-Drain Diode</b>					
V <sub>SD</sub> *d	-	0.77	1.2	V	I <sub>S</sub> =3A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	65	-	ns	I <sub>F</sub> =3A, di/dt=100A/μs
Q <sub>rr</sub>	-	143	-	nC	

**Note:**

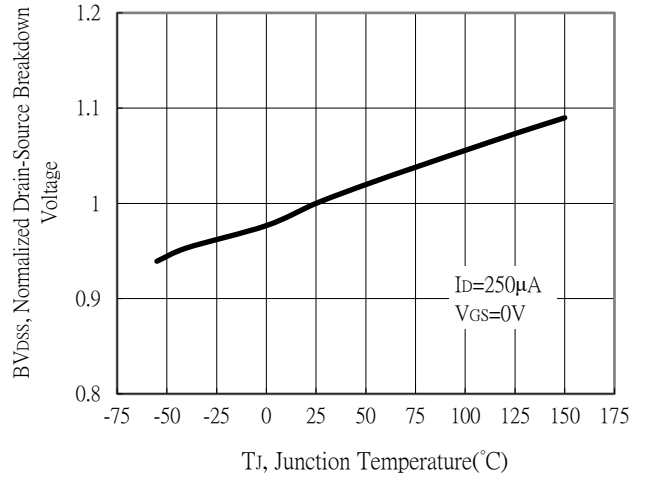
- \*a. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper Dissipation.
- \*b. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz copper, in a still air environment with T<sub>A</sub>=25°C. The power dissipation P<sub>D</sub> is based on R<sub>θJA</sub> 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<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and low duty cycles to keep initial T<sub>J</sub>=25°C.
- \*d. Pulse Test : Pulse Width≤300μs, Duty Cycle≤2%.
- \*e. Independent of operating temperature.

## Typical Characteristics

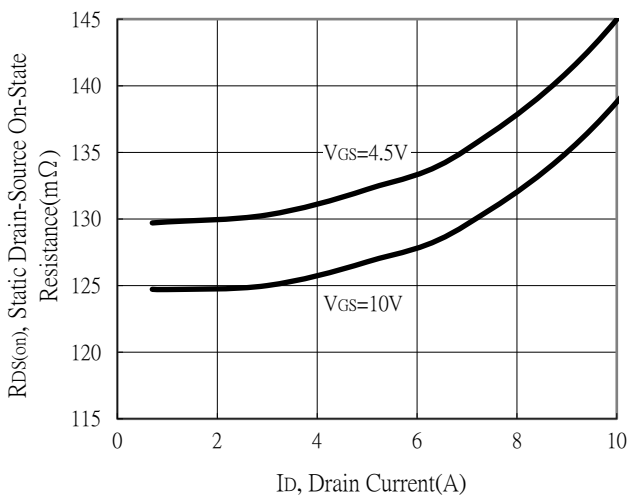
Typical Output Characteristics



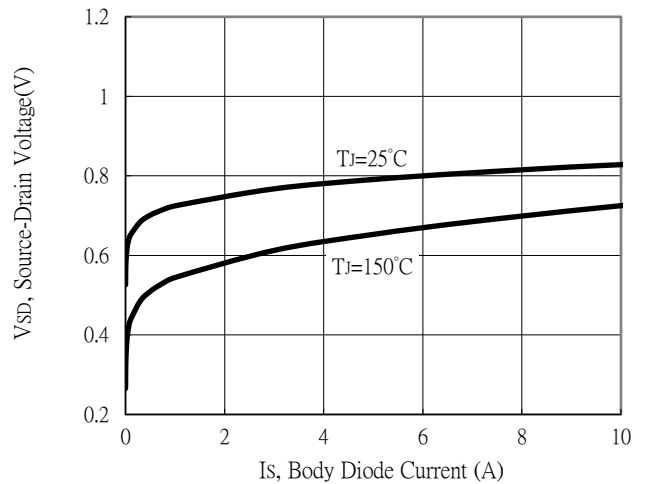
Breakdown Voltage vs Ambient Temperature



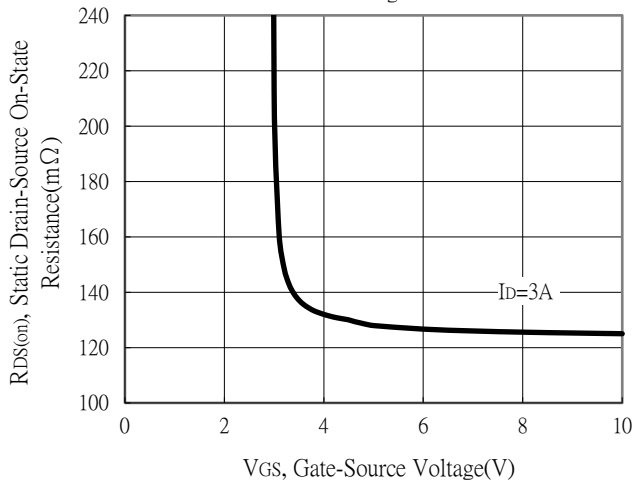
Static Drain-Source On-State resistance vs Drain Current



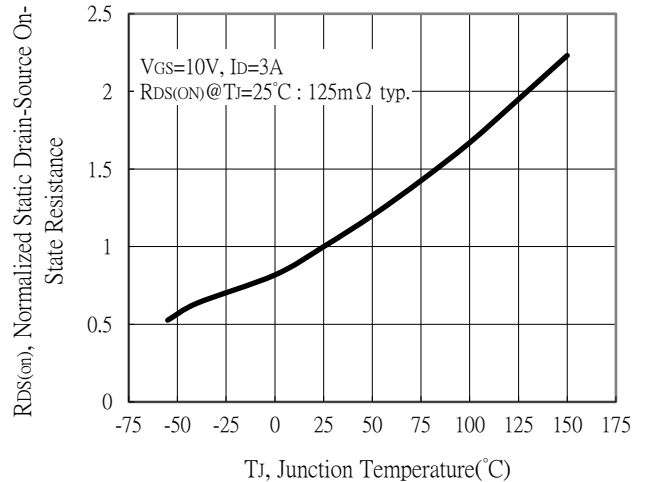
Body Diode Current vs Source-Drain Voltage



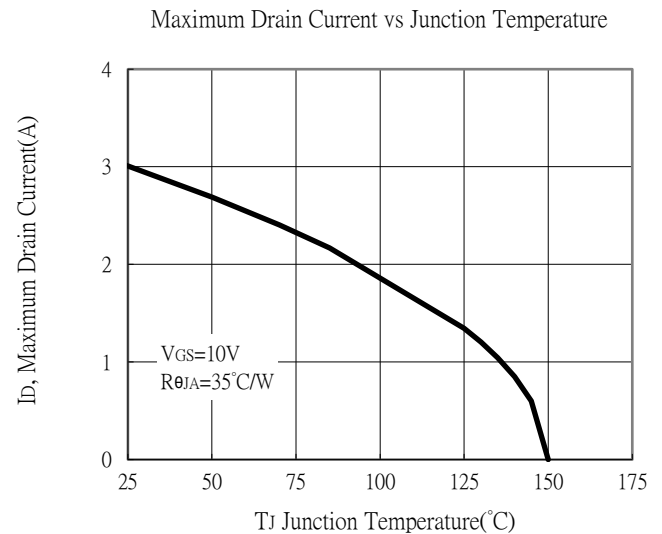
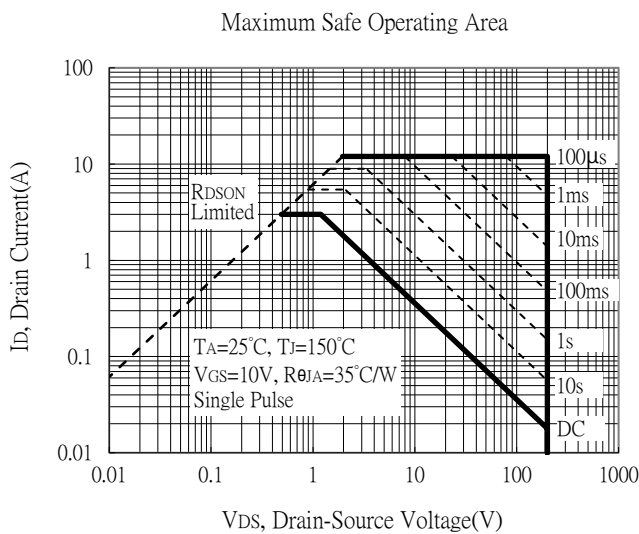
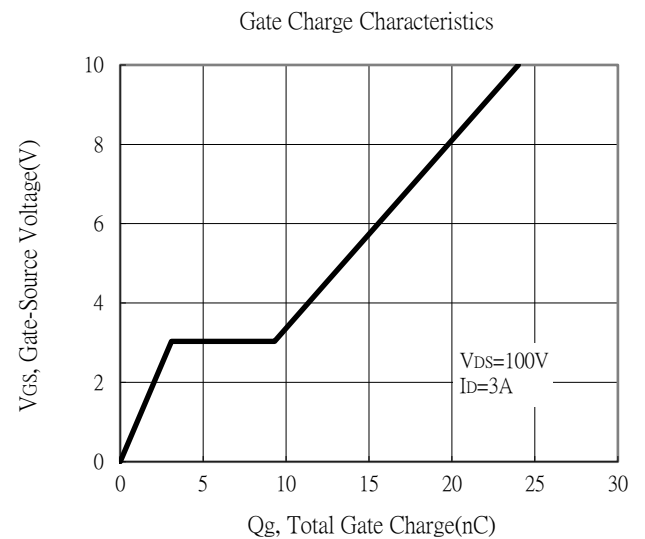
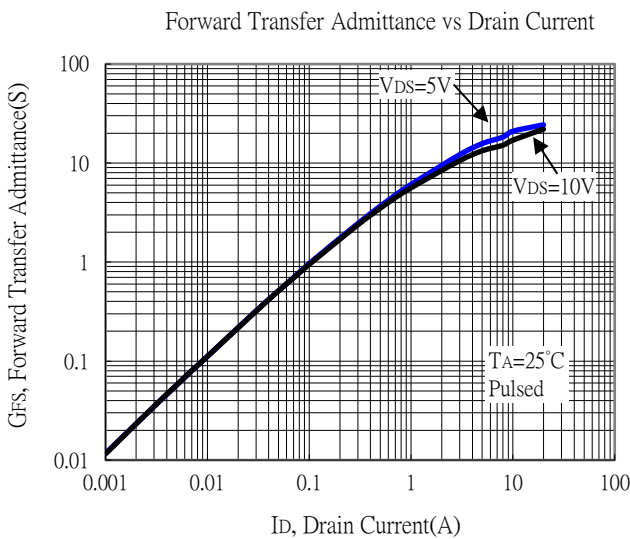
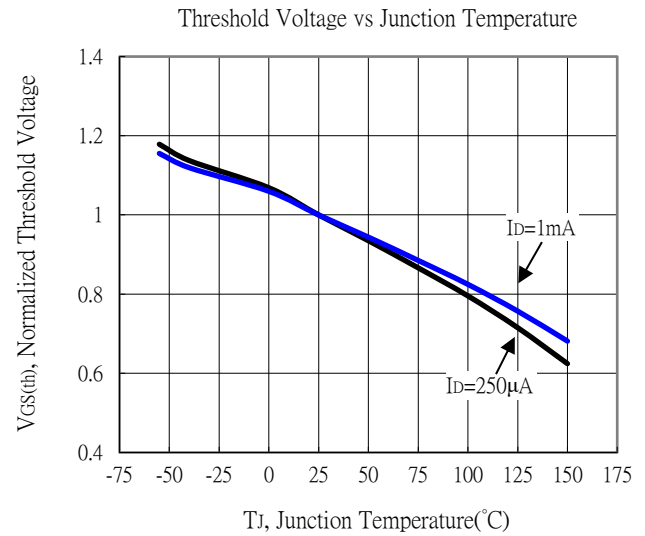
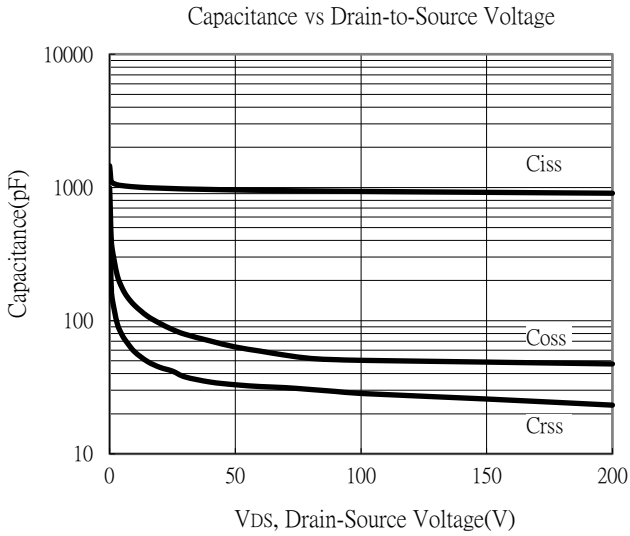
Static Drain-Source On-State Resistance vs Gate-Source Voltage



Drain-Source On-State Resistance vs Junction Temperature



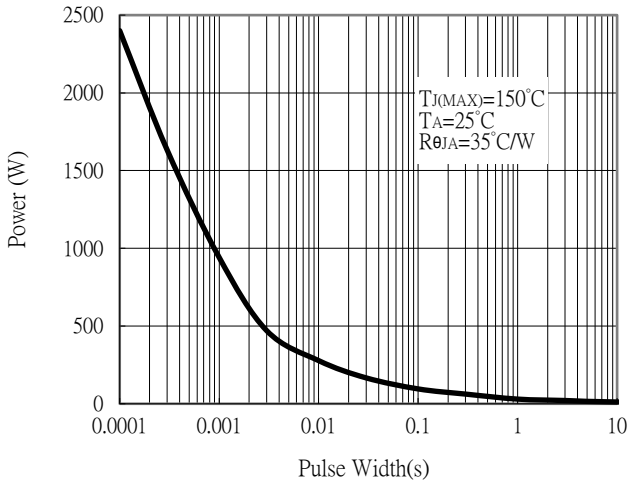
## Typical Characteristics



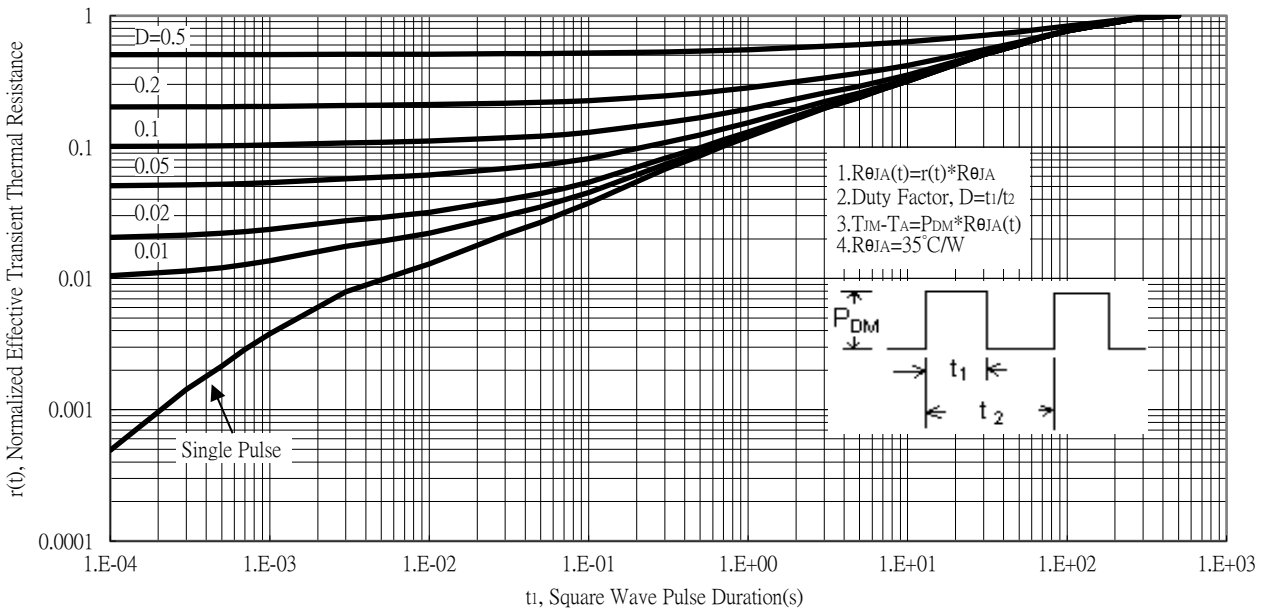


### Typical Characteristics

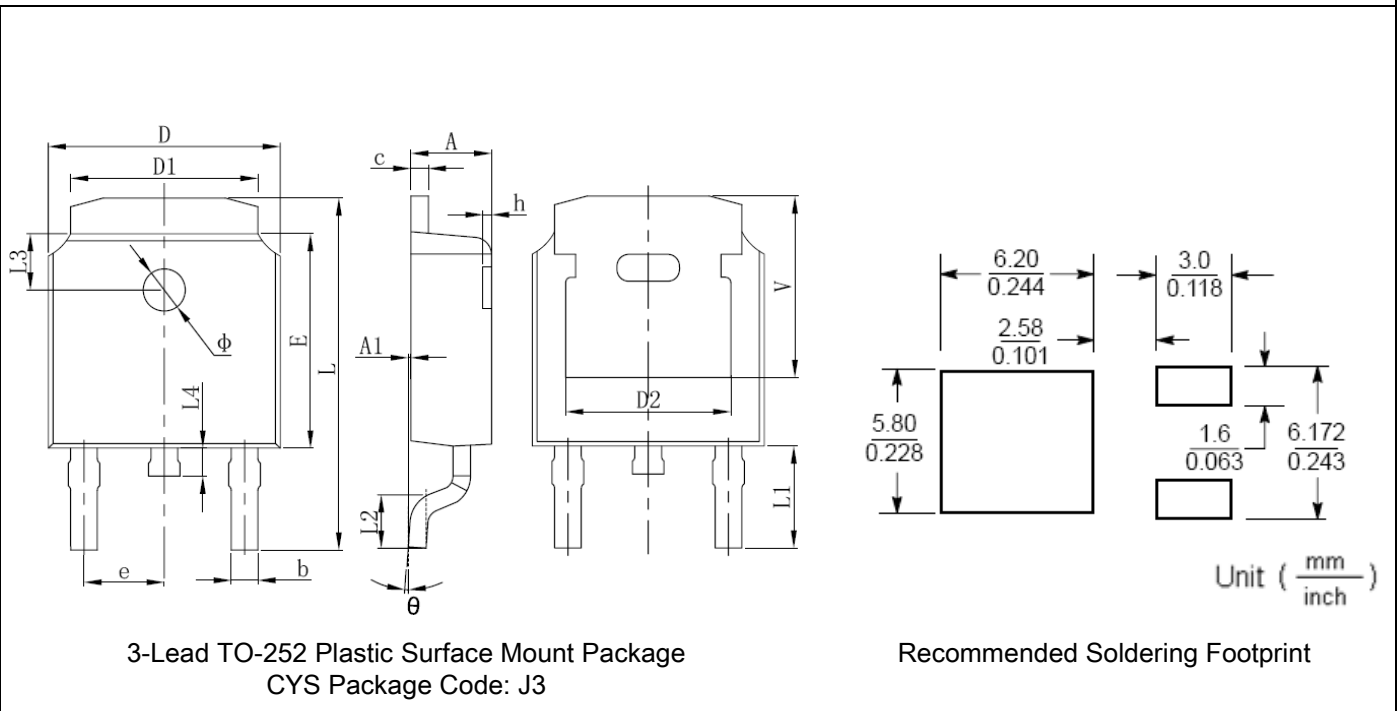
Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves



TO-252 Dimension



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	L	0.382	0.406	9.712	10.312
A1	0.000	0.005	0.000	0.127	L1	0.114	REF	2.900	REF
b	0.025	0.030	0.635	0.770	L2	0.055	0.067	1.400	1.700
c	0.018	0.023	0.460	0.580	L3	0.63	REF	1.600	REF
D	0.256	0.264	6.500	6.700	L4	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	$\Phi$	0.043	0.051	1.100	1.300
D2	0.190	REF	4.830	REF	$\theta$	0°	8°	0°	8°
E	0.236	0.244	6.000	6.200	h	0.000	0.012	0.000	0.300
e	0.086	0.094	2.186	2.386	V	0.207	REF	5.250	REF

**Note:**

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

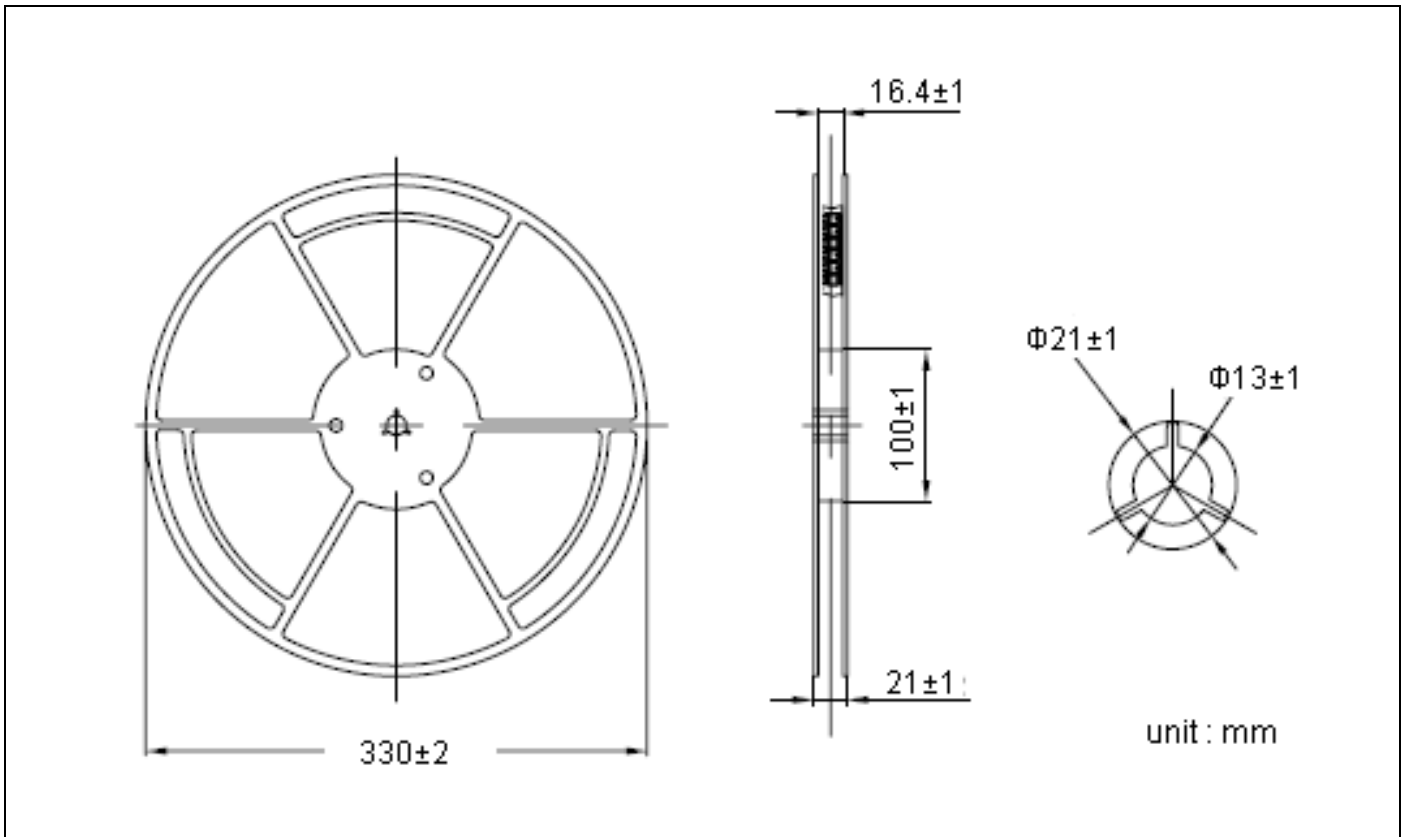
**Material:**

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

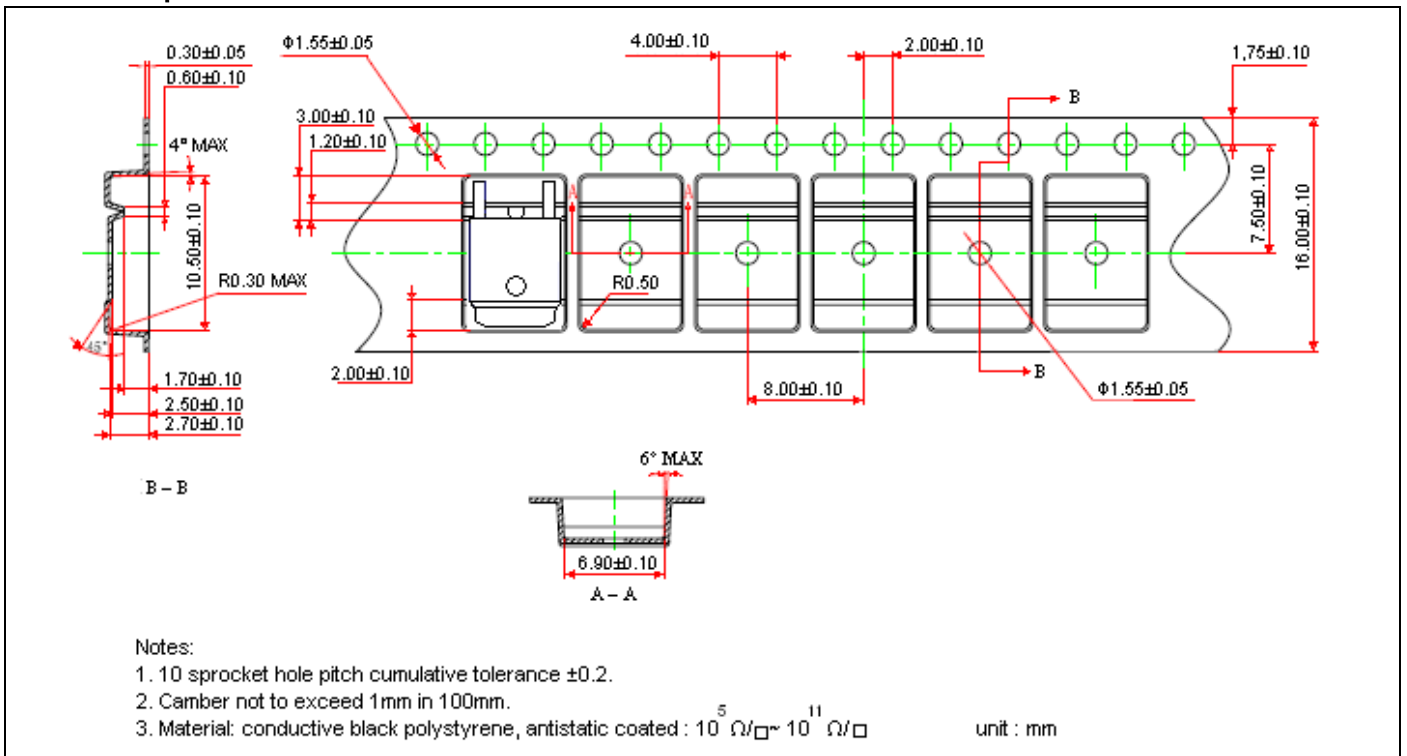
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Reel Dimension



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 <sub>S</sub> max to T <sub>P</sub> )	3°C/second max.	3°C/second max.
Preheat -Temperature Min (T <sub>S</sub> min) -Temperature Max (T <sub>S</sub> max) -Time (t <sub>S</sub> min to t <sub>S</sub> max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T <sub>L</sub> ) -Time (t <sub>L</sub> )	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature (T <sub>P</sub> )	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature (t <sub>P</sub> )	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.