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N-Channel Logic Level Enhancement Mode Power MOSFET

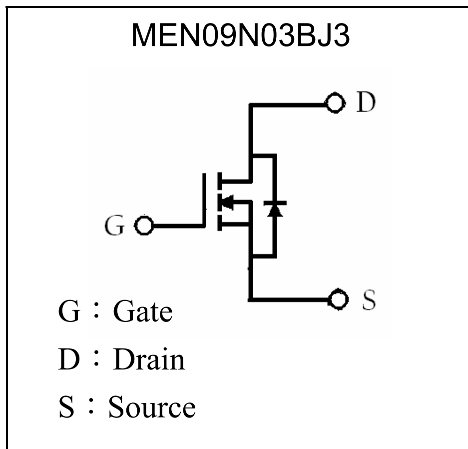
MEN09N03BJ3

BV_{DSS}	30V
I_D	50A
R_{DSON}	9mΩ

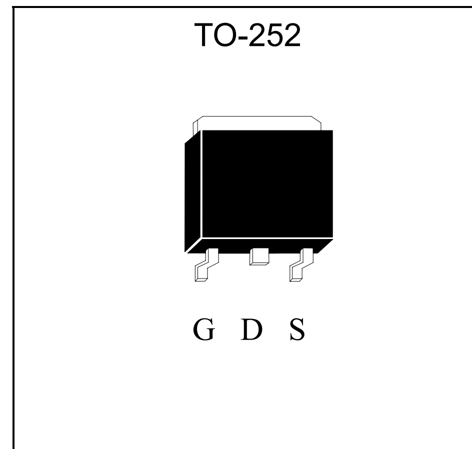
Features

- V_{DS}=30V, I_D=50A, $R_{DS(ON)}$=9mΩ
- Low Gate Charge
- Simple Drive Requirement
- RoHS compliant package
- Repetitive Avalanche Rated
- Fast Switching Characteristic

Symbol



Outline



Absolute Maximum Ratings (Tc=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current @ Tc=25°C	I_D	50	A
Continuous Drain Current @ Tc=100°C	I_D	35	A
Pulsed Drain Current	I_{DM}	140 *1	A
Avalanche Current	I_{AS}	37.5	A
Avalanche Energy @ L=0.1mH, I_D=37.5A,Rg=25Ω	E_{AS}	70	mJ
Repetitive Avalanche Energy @ L=0.05mH	E_{AR}	15 *2	mJ
Power Dissipation (Tc=25℃)	P_D	60	W
Power Dissipation (Tc=100℃)		32	W
Operating Junction and Storage Temperature	Tj, Tstg	-55~+175	°C

100% UIS testing in condition of V_D=15V, L=0.1mH, V_G=10V, I_L=25A, Rated V_{DS}=25V N-CH

Note : *1. Pulse width limited by maximum junction temperature
*2. Duty cycle≤1%

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Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	75	°C/W

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	30	-	-	V	V_{GS}=0, I_D=250μA
$V_{GS(th)}$	1.0	1.7	3.0	V	V_{DS} = V_{GS}, I_D=250μA
G_{FS}	-	20	-	S	V_{DS} =5V, I_D=20A
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
$I_{D(ON)}$	50	-	-	A	V_{GS} =10V, V_{DS}=10V
*$R_{DS(ON)}$	-	7.5	9	mΩ	V_{GS} =10V, I_D=25A
	-	12	15		V_{GS} =5V, I_D=20A
Dynamic					
Rg	-	1.7	-	Ω	V_{GS}=15mV, V_{DS}=0, f=1MHz
*Qg(V_{GS}=10V)	-	23	-	nC	I_D=25A, V_{DS}=15V, V_{GS}=10V
*Qg(V_{GS}=5V)	-	13	-		
*Qgs	-	4.7	-		
*Qgd	-	7.4	-		
*$t_{d(ON)}$	-	10	-	ns	V_{DS}=15V, I_D=25A, V_{GS}=10V, R_G=2.7Ω, R_D=0.6Ω
*tr	-	8	-		
*$t_{d(OFF)}$	-	30	-		
*t_f	-	5	-		
Ciss	-	2020	-	pF	V_{GS}=0V, V_{DS}=15V, f=1MHz
Coss	-	275	-		
Crss	-	160	-		
Source-Drain Diode					
*I_S	-	-	50	A	
*I_{SM}	-	-	140		
*V_{SD}	-	-	1.3	V	I_F=I_S, V_{GS}=0
*trr	-	22	-	ns	I_F=I_S, dI_F/dt=100A/μs
*$I_{RM(REC)}$	-	180	-	A	
*Qrr	-	12	-	nC	

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

Ordering Information

Device	Package	Shipping	Marking
MEN09N03BJ3	TO-252 (RoHS compliant)	2500 pcs / Tape & Reel	09N03

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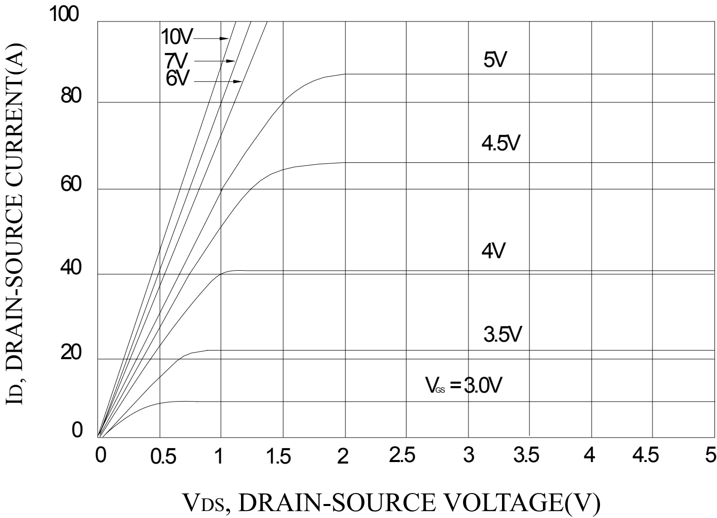
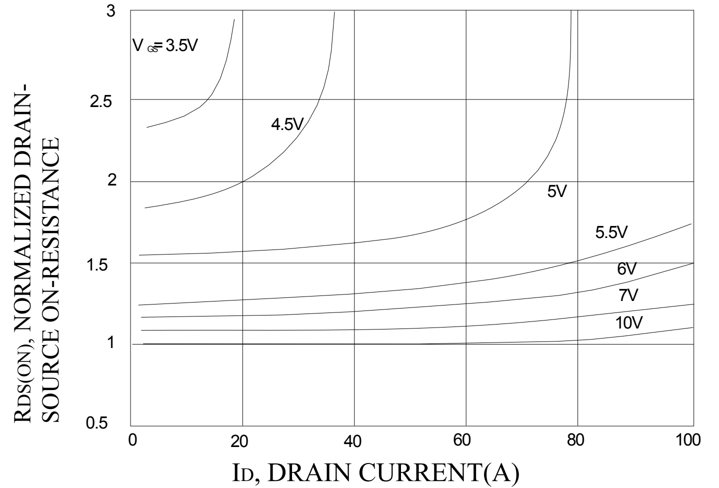
Characteristic Curves

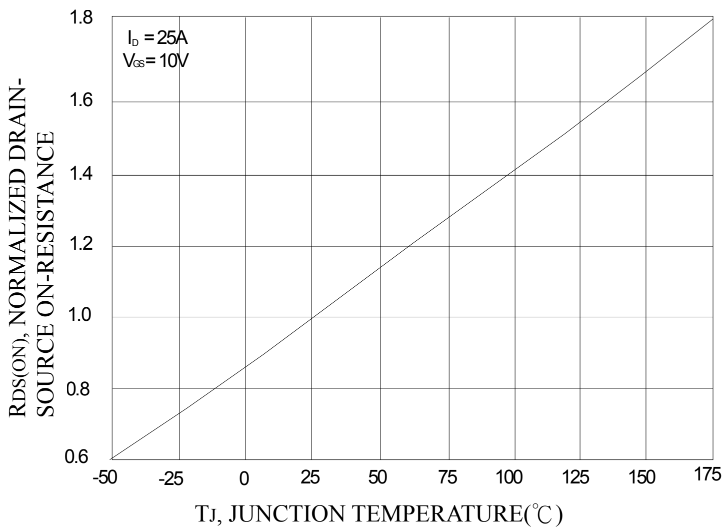
ON-REGION CHARACTERISTIC



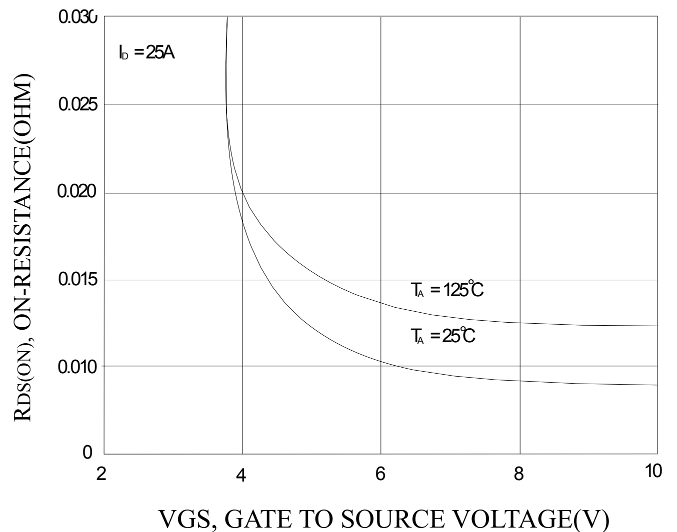
ON-RESISTANCE VARIATION WITH DRAIN CURRENT AND GATE VOLTAGE



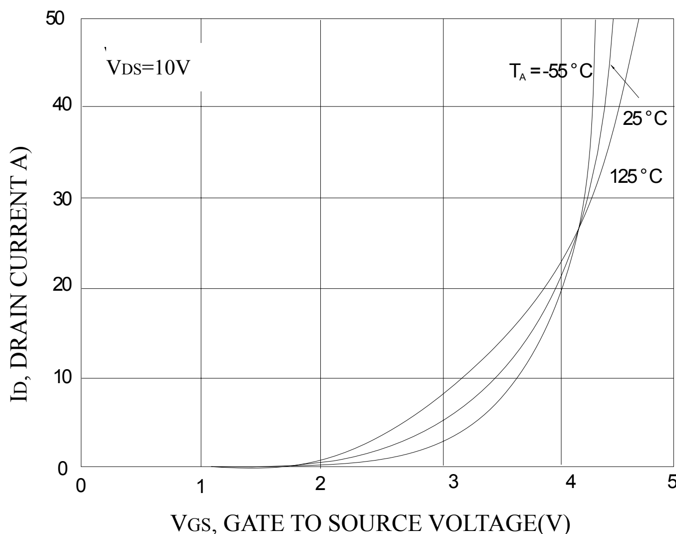
ON-RESISTANCE VARIATION WITH TEMPERATURE



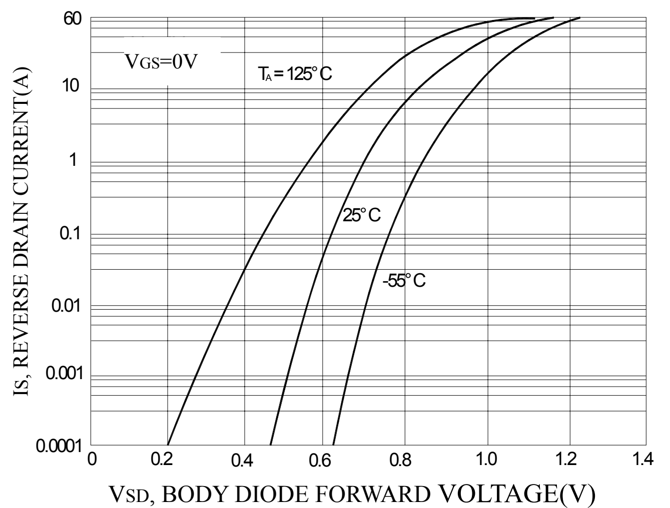
ON-RESISTANCE VARIATION WITH GATE TO SOURCE VOLTAGE



TRANSFER CHARACTERISTICS



BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE



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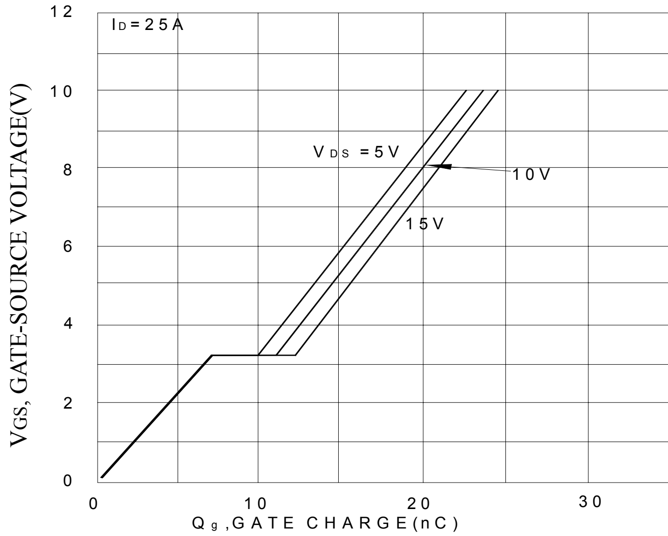
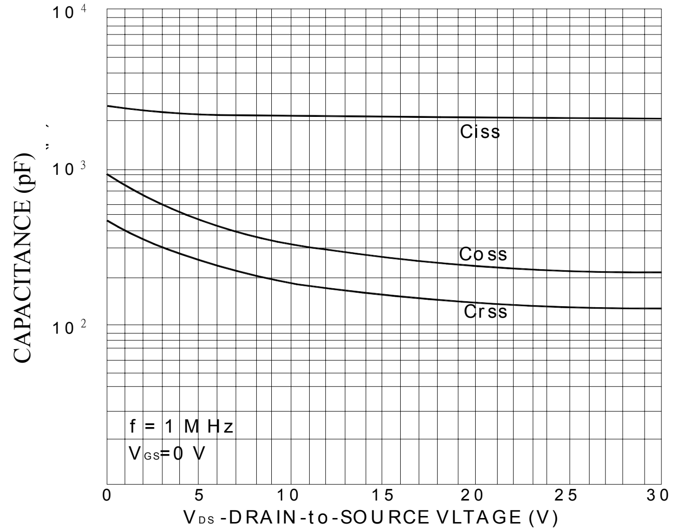
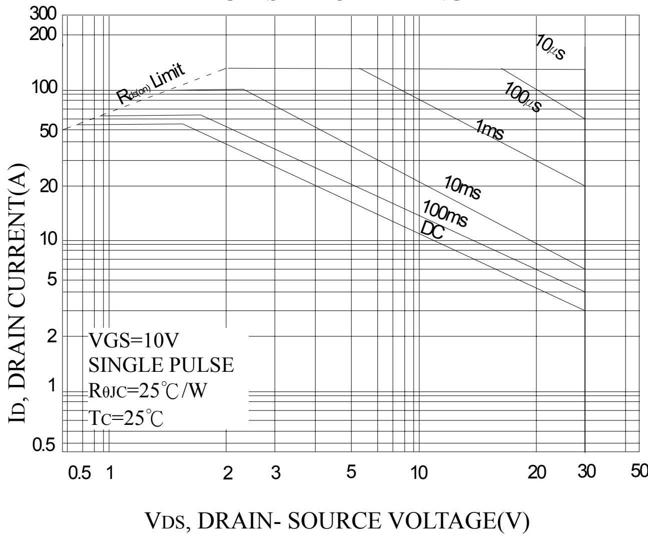
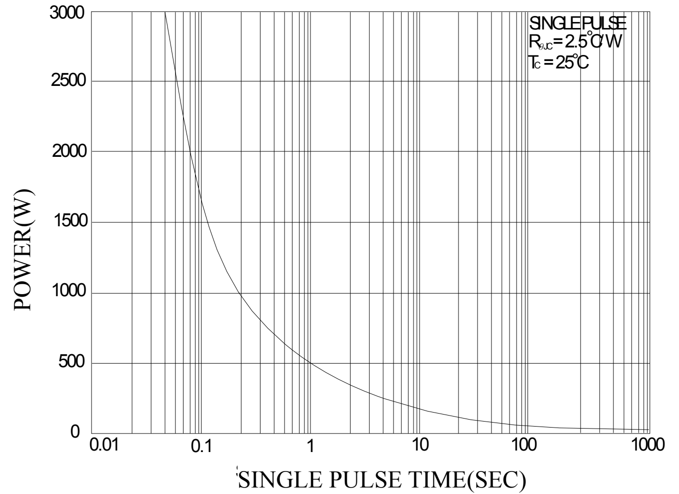
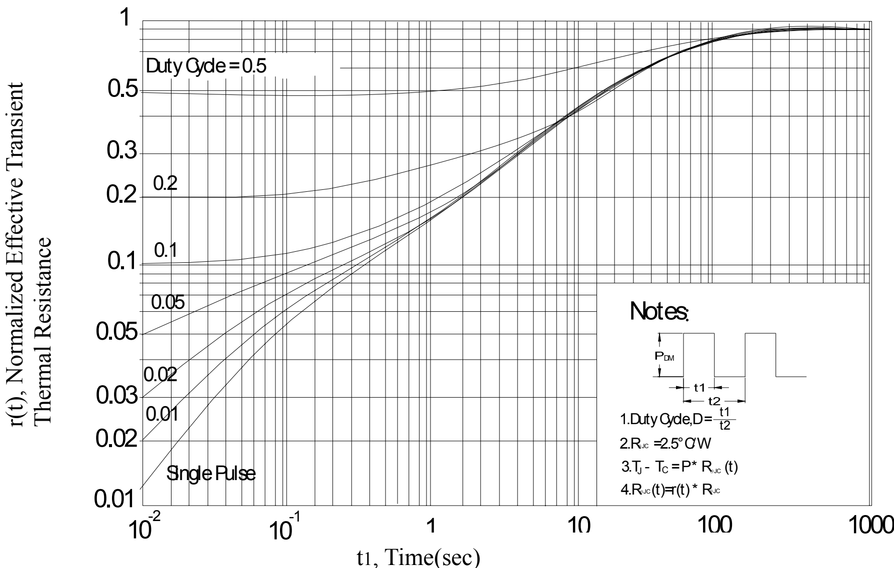
Characteristic Curves(Cont.)











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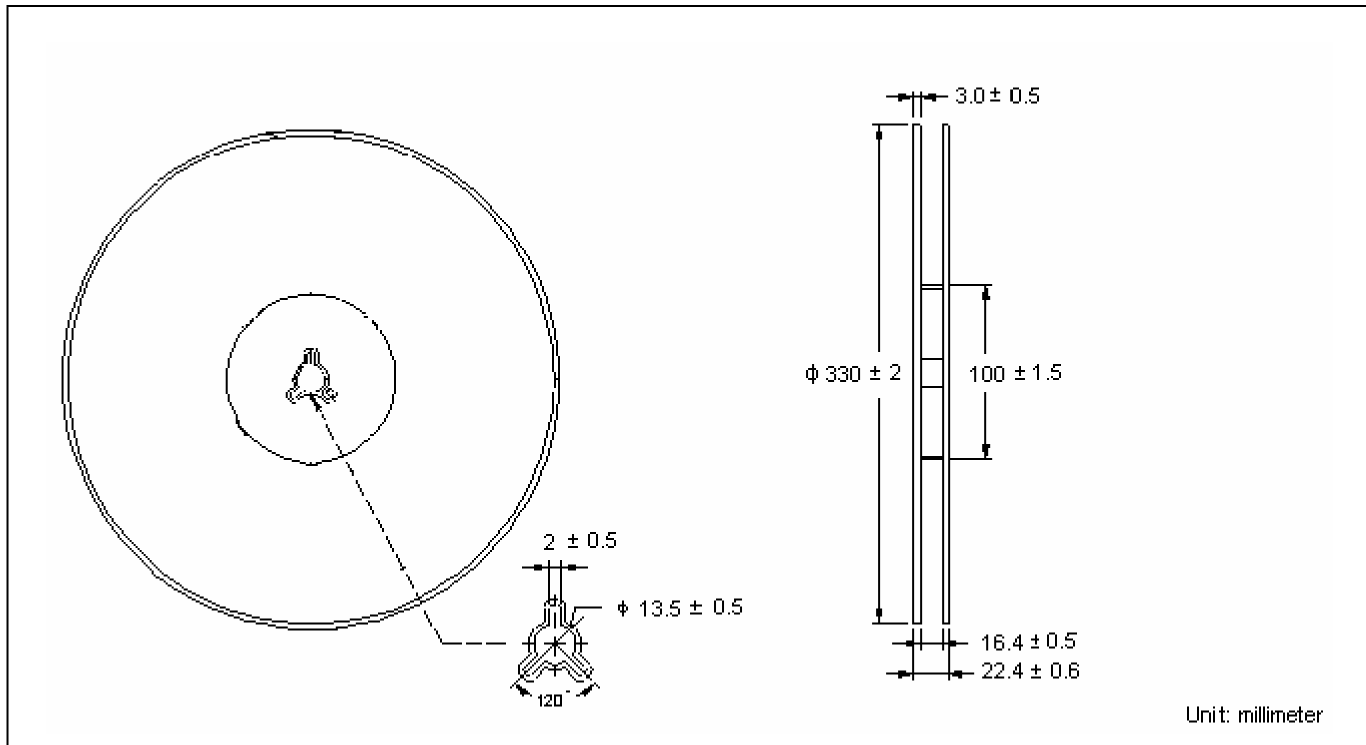
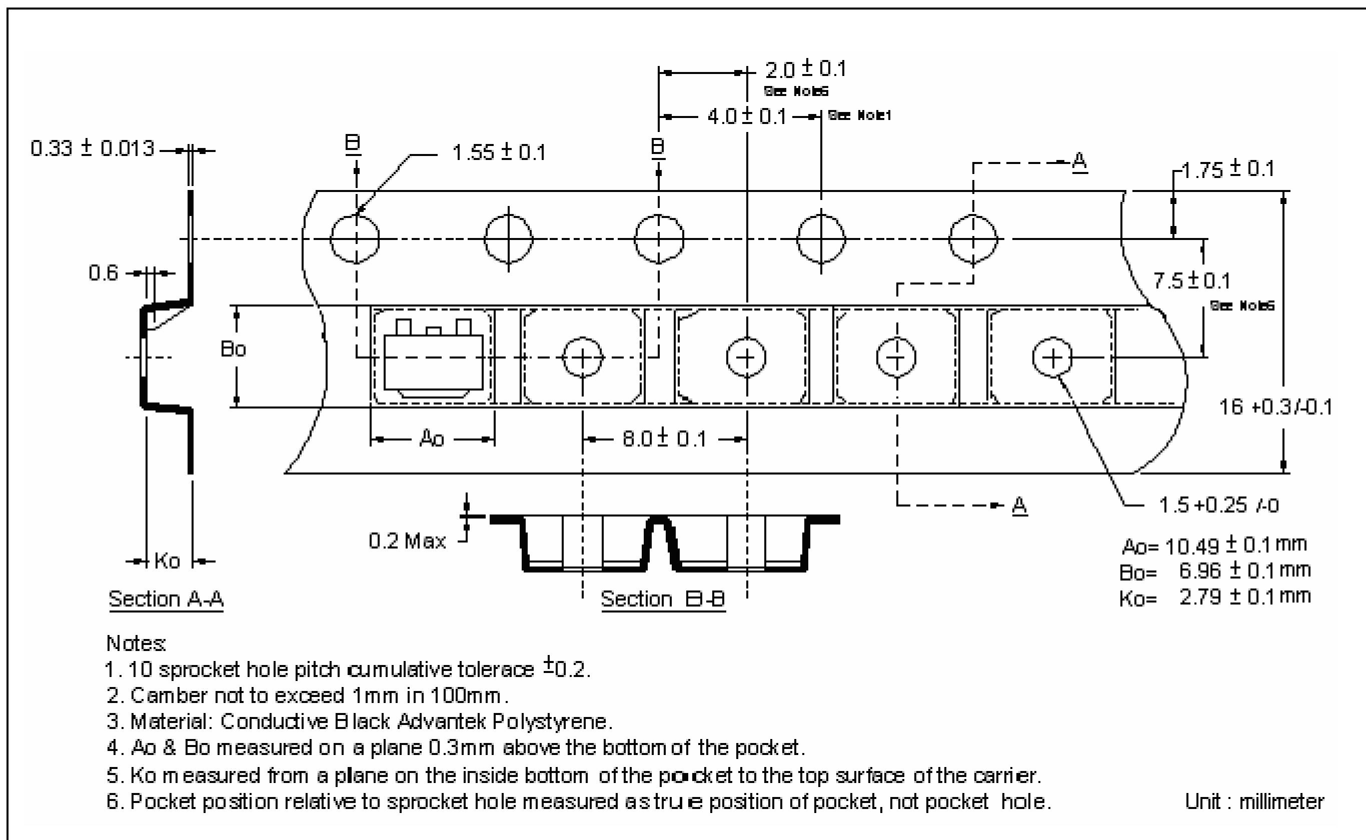
Reel Dimension



Carrier Tape Dimension



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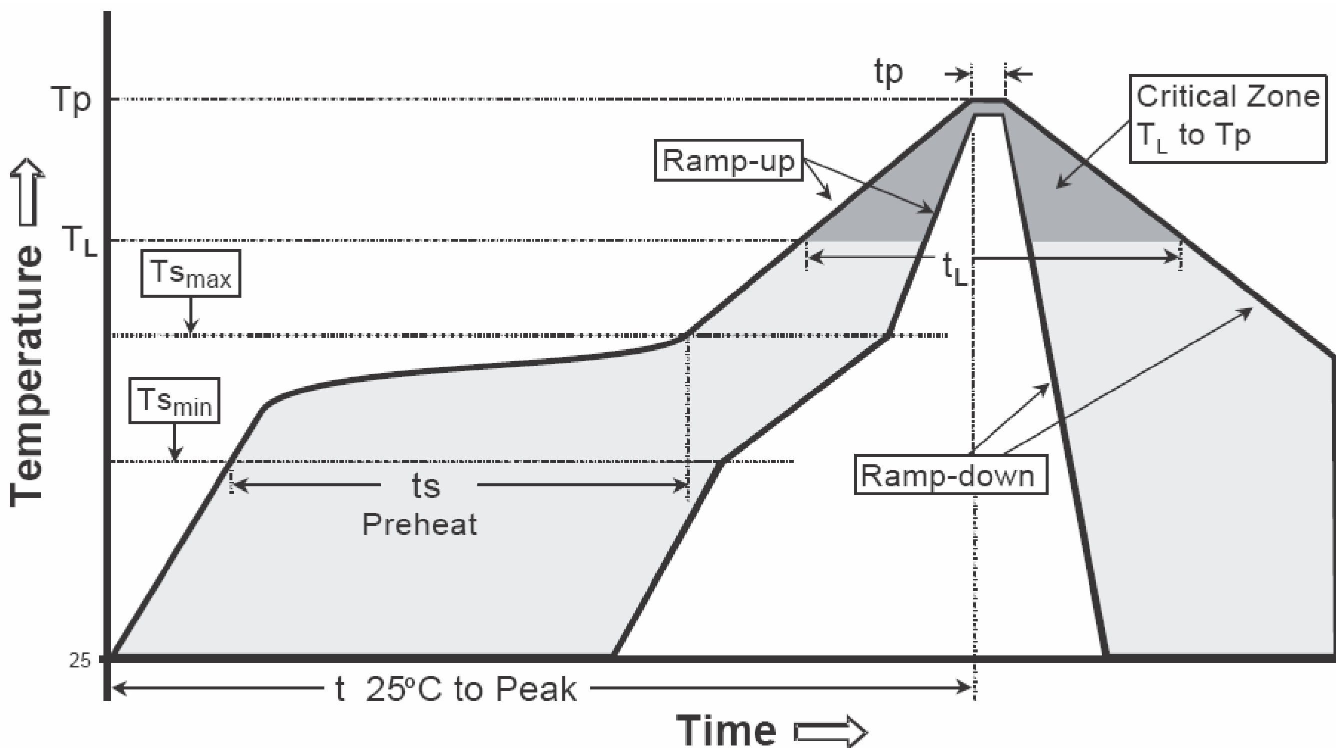
Recommended wave soldering condition

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(ts_{min} to ts_{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.

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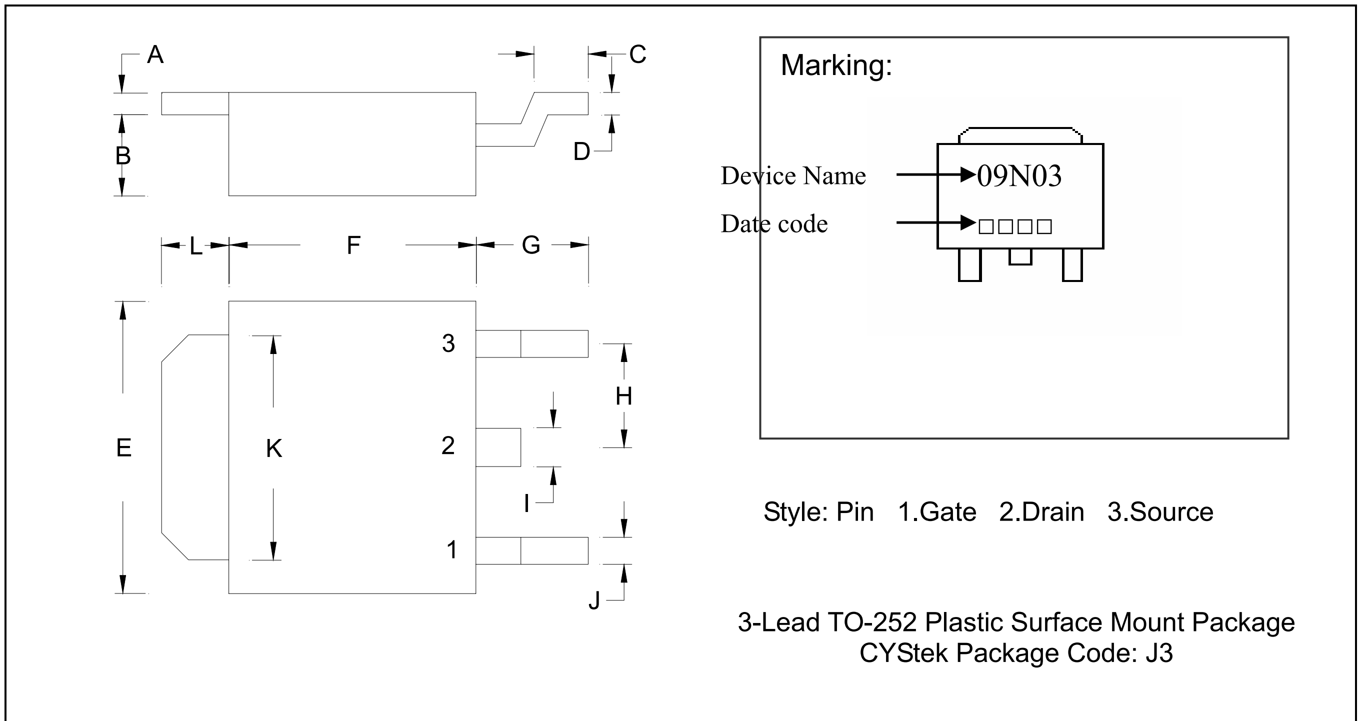
TO-252 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.0177	0.0217	0.45	0.55	G	0.0866	0.1102	2.20	2.80
B	0.0650	0.0768	1.65	1.95	H	-	*0.0906	-	*2.30
C	0.0354	0.0591	0.90	1.50	I	-	0.0449	-	1.14
D	0.0177	0.0236	0.45	0.60	J	-	0.0346	-	0.88
E	0.2441	0.2677	6.20	6.80	K	0.2047	0.2165	5.20	5.50
F	0.2125	0.2283	5.40	5.80	L	0.0551	0.0630	1.40	1.60

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 : KFC; tin plating
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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