N-Channel Enhancement Mode MOSFET

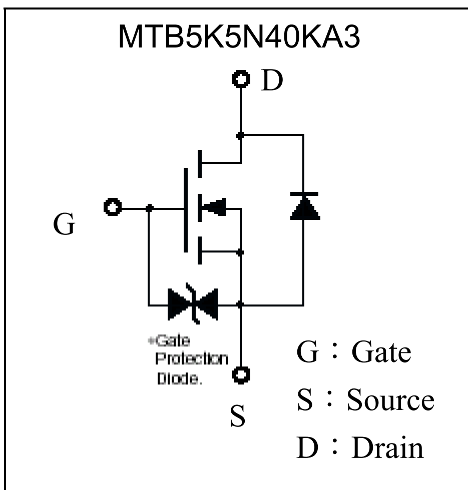
MTB5K5N40KA3

BV_{DSS}	400V
I_D@V_{GS}=10V, T_A=25˚C	250mA
R_{DSON} @V_{GS}=10V, I_D=0.1A	4.2Ω(typ.)
R_{DSON} @V_{GS}=4.5V, I_D=0.1A	4.2Ω(typ.)

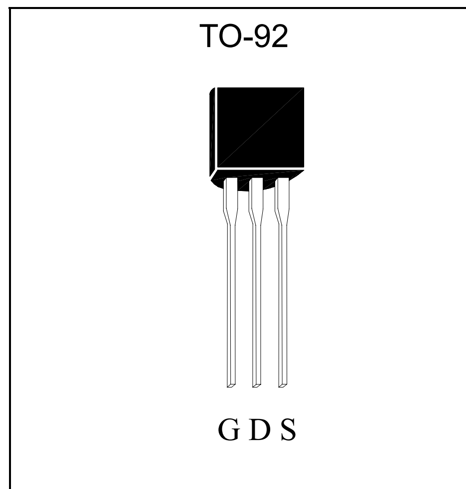
Features

- Low on-resistance
- High ESD capability, ≥ 4kV (HBM)
- High speed switching
- Easily designed drive circuits
- Easy to use in parallel
- Pb-free lead plating and halogen-free package

Symbol

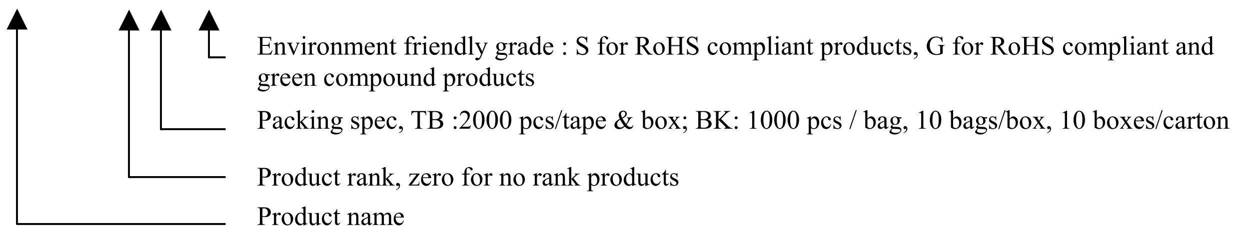


Outline



Ordering Information

Device	Package	Shipping
MTB5K5N40KA3-0-TB-G	TO-92 (Pb-free lead plating and halogen-free package)	2000 pcs / Tape & Box
MTB5K5N40KA3-0-BK-G		1000 pcs/ bag, 10 bags/box, 10boxes/carton



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DSS}	400	V
Gate-Source Voltage	V_{GSS}	±12	
Drain Current @ V_{GS}=10V, T_A=25°C	I_D	250	mA
Drain Current @ V_{GS}=10V, T_A=70°C		200 *1	
Pulsed Drain Current	I_{DM}	1.5	A
Total Power Dissipation	P_D	755 *1	mW
ESD susceptibility		4000 *2	V
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+150	°C

Note : *1. Pulse Width ≤ 300μs, Duty cycle ≤2%
*2. Human body model, 1.5kΩ in series with 100pF

Thermal Data

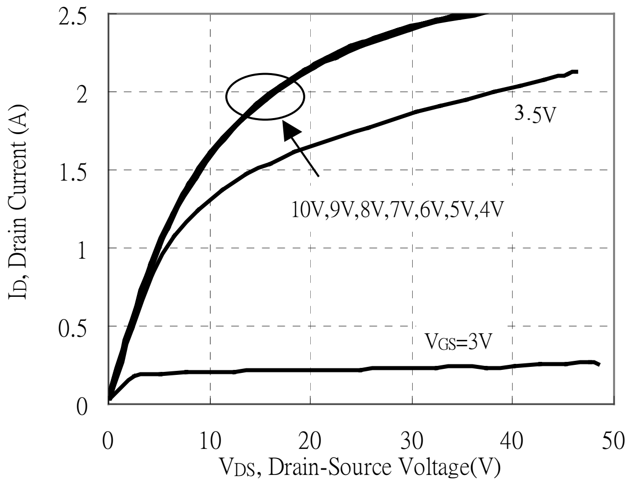
Parameter	Symbol	Maximum	Unit
Max. Thermal Resistance, Junction-to-case	$R_{\theta JC}$	45	°C/W
Max. Thermal Resistance, Junction-to-ambient	$R_{\theta JA}$	167	

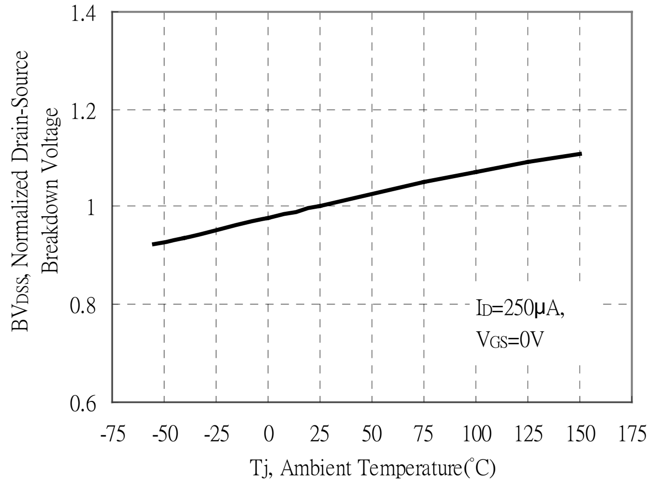
Electrical Characteristics (Ta=25°C)

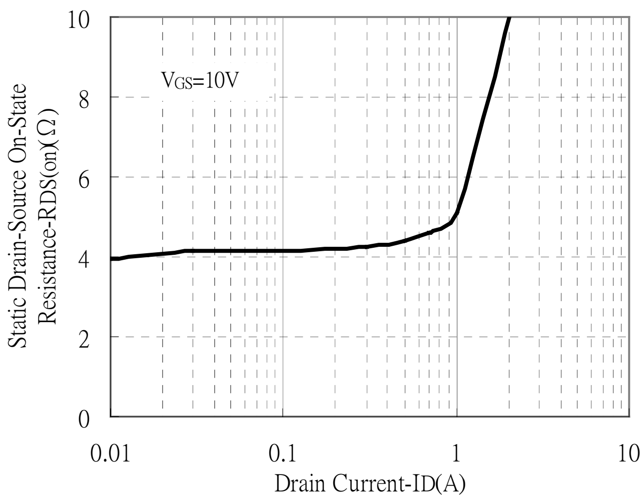
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}* 1	400	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1.3	-	2.6		V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±10	μA	V_{GS}=±12V, V_{DS}=0V
I_{DSS}	-	-	1		V_{DS}=320V, V_{GS}=0V
$R_{DS(ON)}$* 1	-	4.2	6	Ω	V_{GS}=10V, I_D=100mA
	-	4.2	8		V_{GS}=4.5V, I_D=100mA
G_{FS}	200	670	-	mS	V_{DS}=10V, I_D=100mA
Dynamic					
C_{iss}	-	171	-	pF	V_{DS}=100V, V_{GS}=0V, f=1MHz
C_{oss}	-	15	-		
C_{rss}	-	7	-		
$t_{d(ON)}$ *1, 2	-	6.2	-	ns	V_{DS}=200V, I_D=0.1A, V_{GS}=10V, R_G=6Ω
tr *1, 2	-	15.8	-		
$t_{d(OFF)}$ *1, 2	-	18.4	-		
t_f *1, 2	-	251.8	-		
Qg *1, 2	-	5.2	-	nC	V_{DS}=320V, V_{GS}=10V, I_D=0.1A
Qgs *1, 2	-	1.2	-		
Qgd *1, 2	-	1.6	-		
Source-Drain Diode					
*I_S	-	-	250	mA	
*I_{SM}	-	-	1.5	A	
*V_{SD}	-	0.73	1.2	V	I_S=100mA, V_{GS}=0V

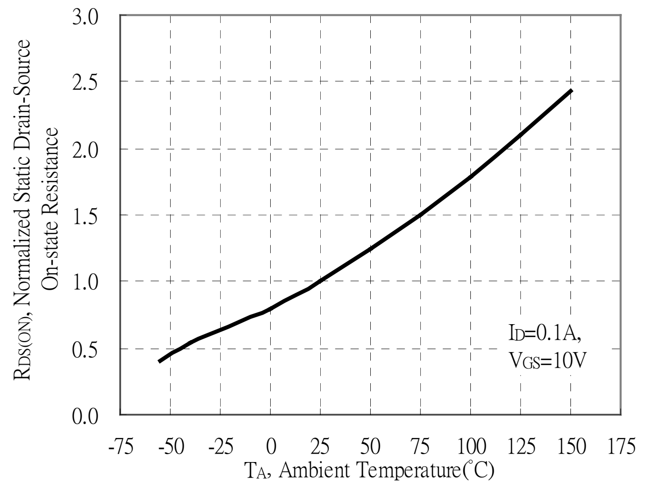
*Pulse Test : Pulse Width ≤380μs, Duty Cycle≤2%

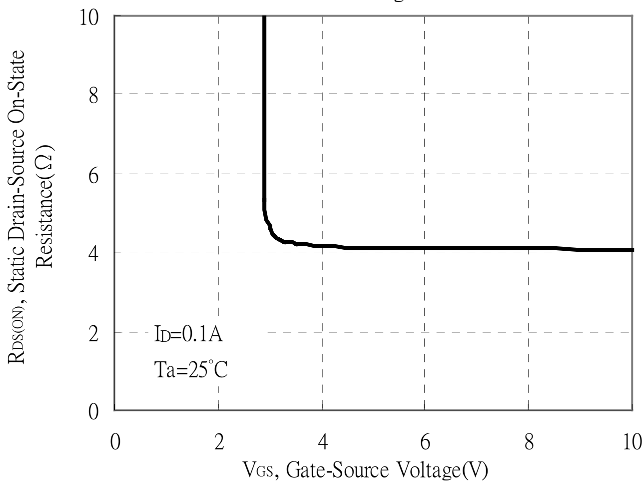
Typical Characteristics

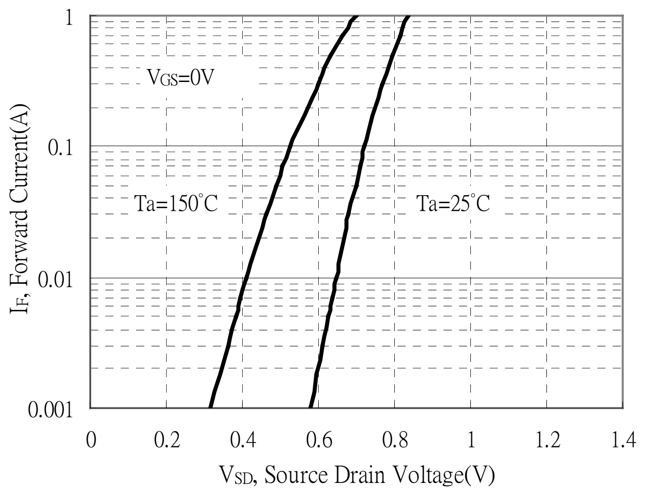




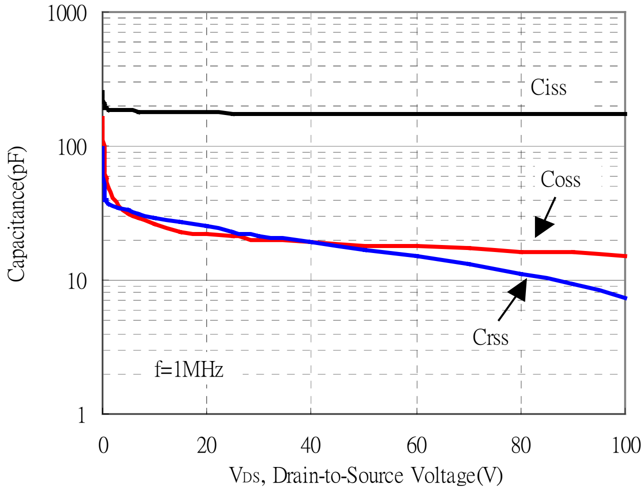


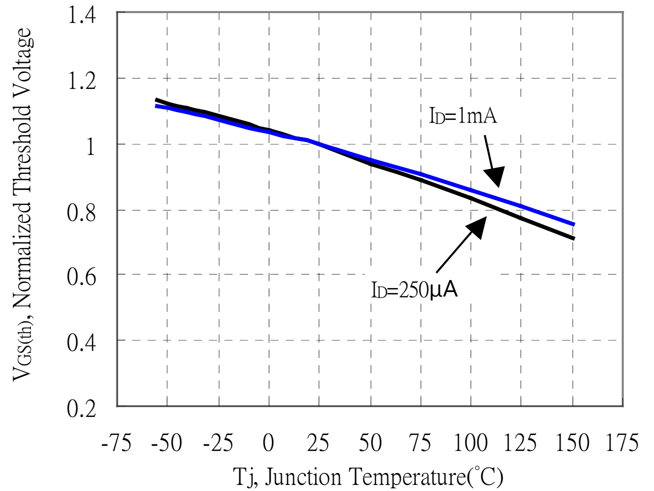


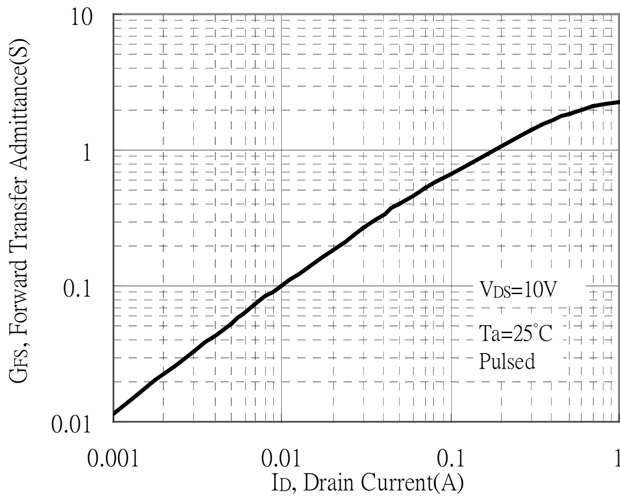


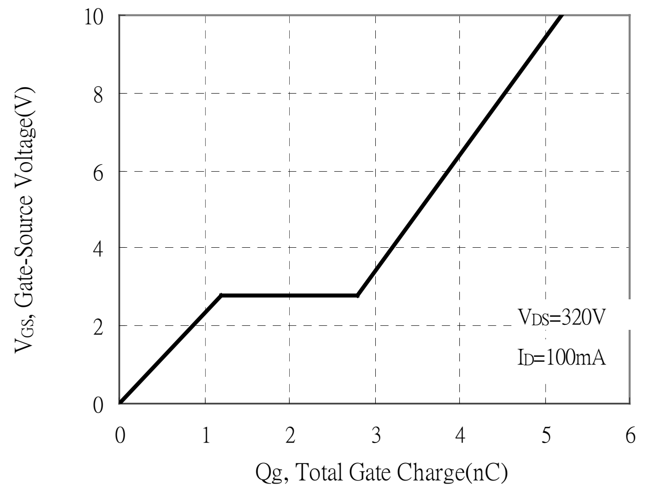


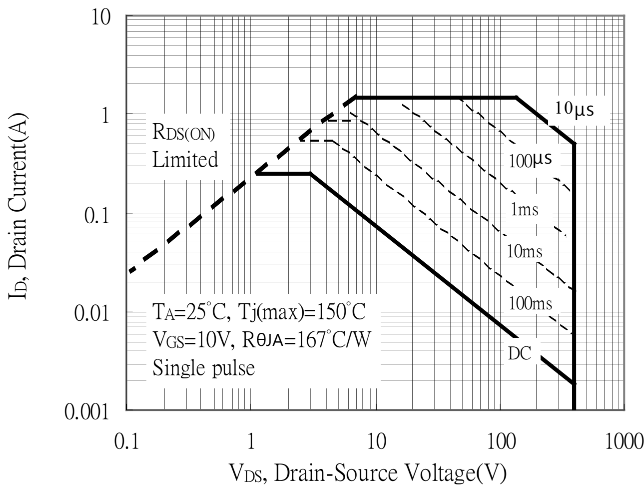
Typical Characteristics(Cont.)

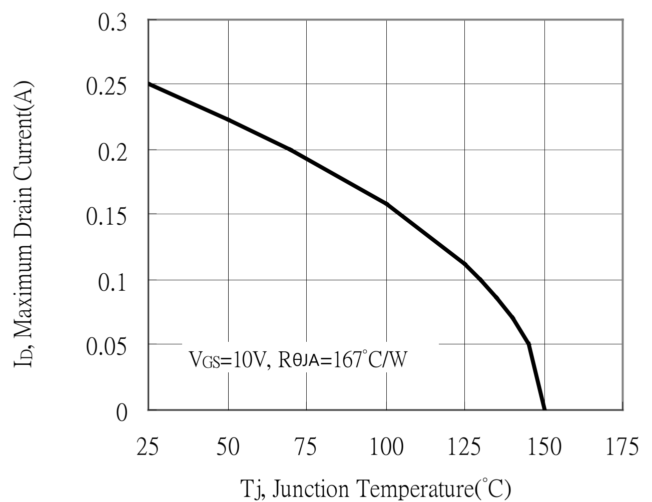




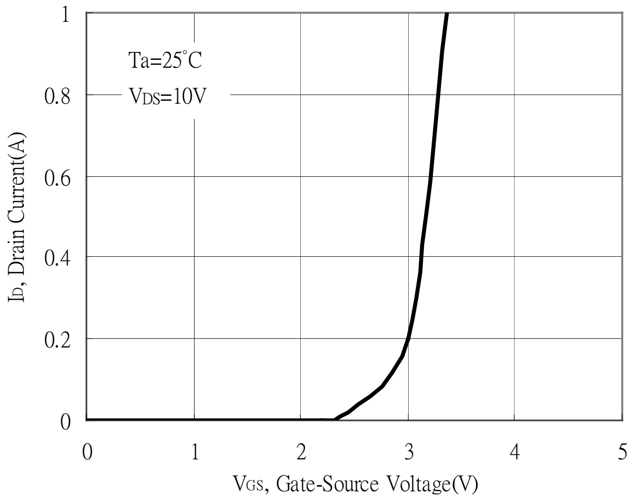


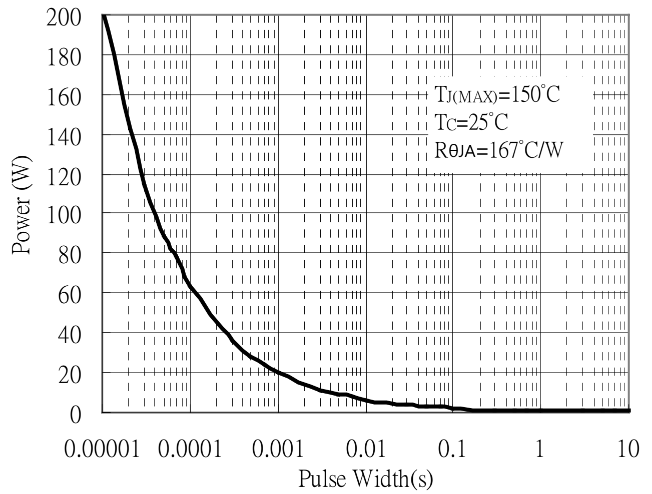


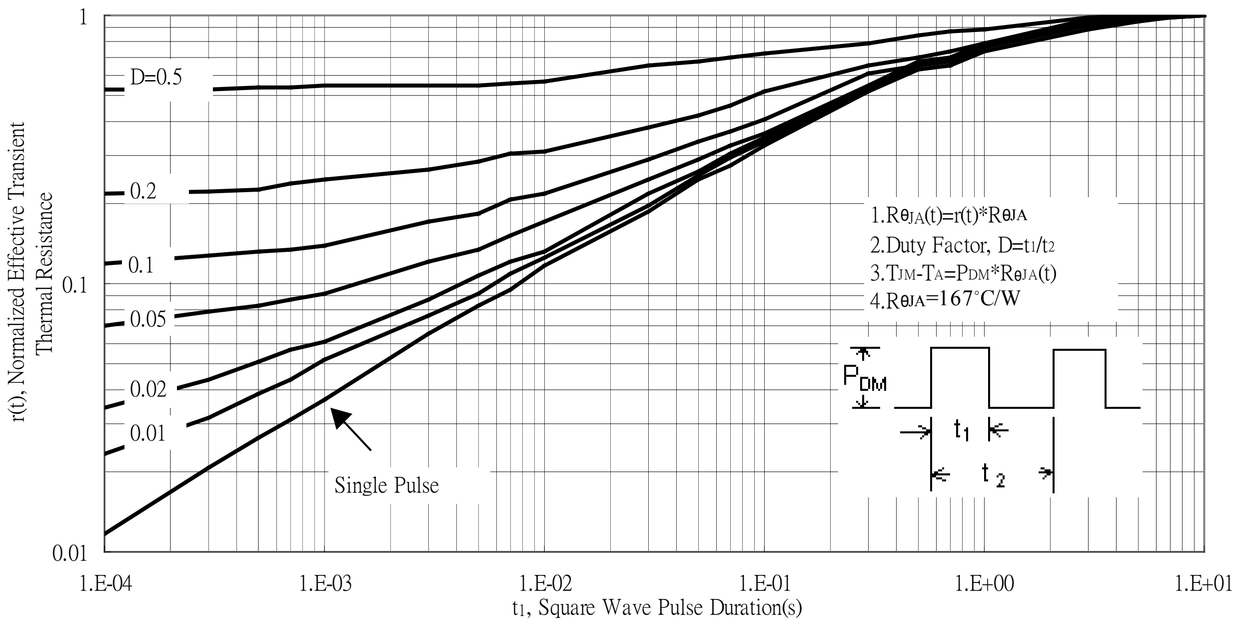




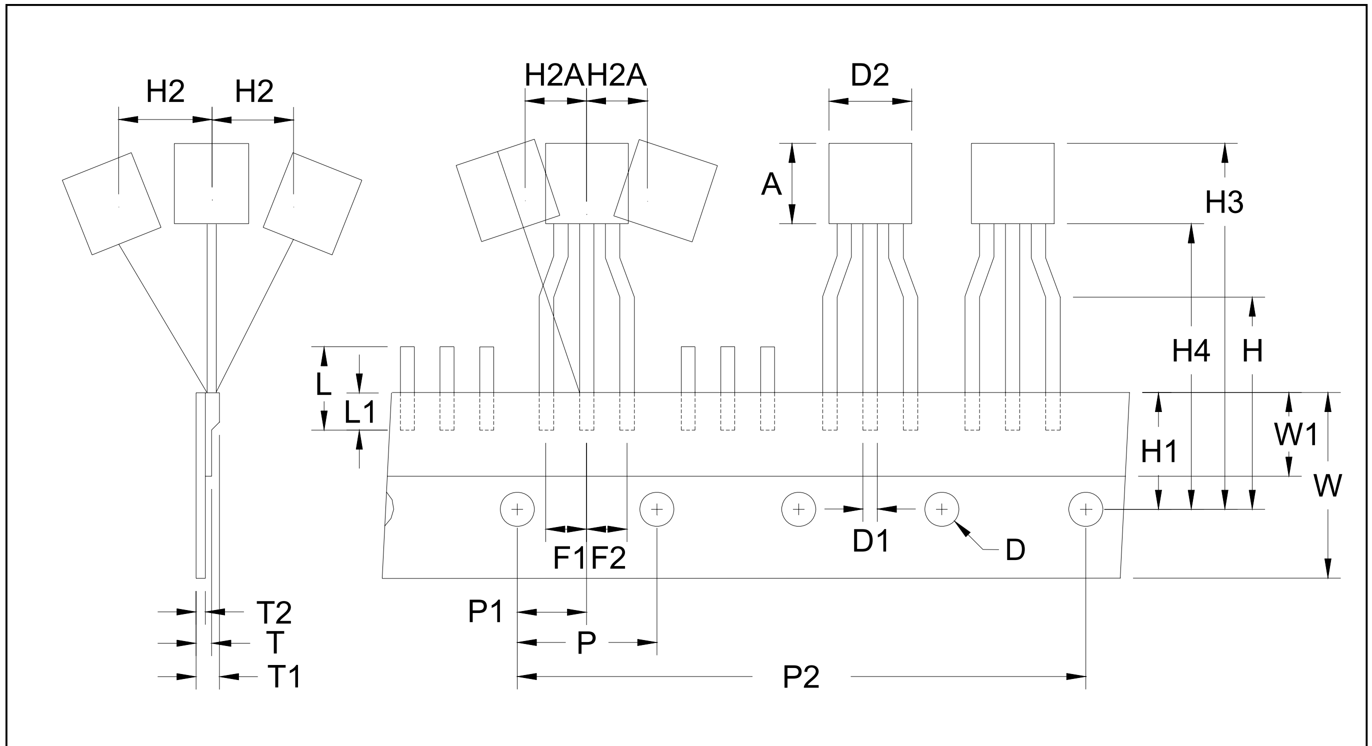
Typical Characteristics(Cont.)







TO-92 Taping Outline

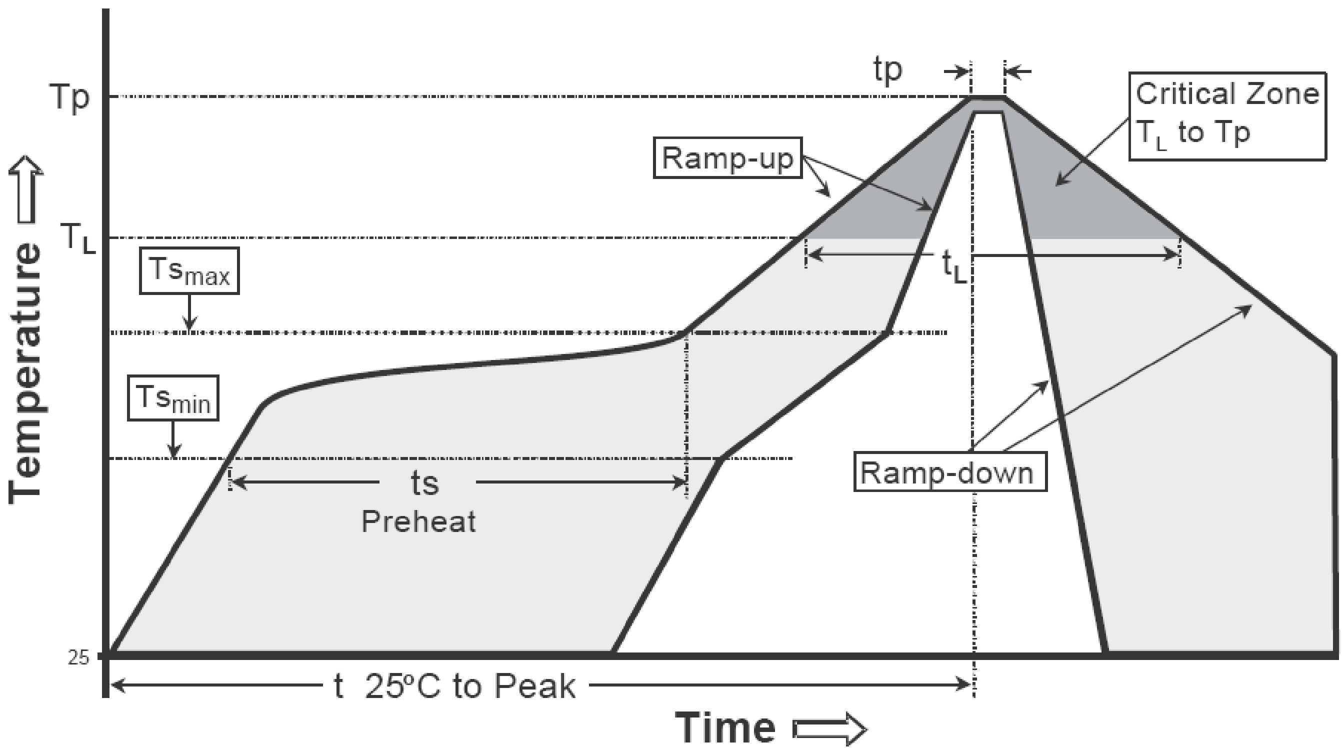


DIM	Item	Millimeters	
		Min.	Max.
A	Component body height	4.33	4.83
D	Tape Feed Diameter	3.80	4.20
D1	Lead Diameter	0.36	0.53
D2	Component Body Diameter	4.33	4.83
F1,F2	Component Lead Pitch	2.40	2.90
F1,F2	F1-F2	-	±0.3
H	Height Of Seating Plane	15.50	16.50
H1	Feed Hole Location	8.50	9.50
H2	Front To Rear Deflection	-	1
H2A	Deflection Left Or Right	-	1
H3	Component Height	-	27
H4	Feed Hole To Bottom Of Component	-	21
L	Lead Length After Component Removal	-	11
L1	Lead Wire Enclosure	2.50	-
P	Feed Hole Pitch	12.50	12.90
P1	Center Of Seating Plane Location	5.95	6.75
P2	4 Feed Hole Pitch	50.30	51.30
T	Over All Tape Thickness	-	0.55
T1	Total Taped Package Thickness	-	1.42
T2	Carrier Tape Thickness	0.36	0.68
W	Tape Width	17.50	19.00
W1	Adhesive Tape Width	5.00	7.00
-	20 pcs Pitch	253	255

Recommended wave soldering condition

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

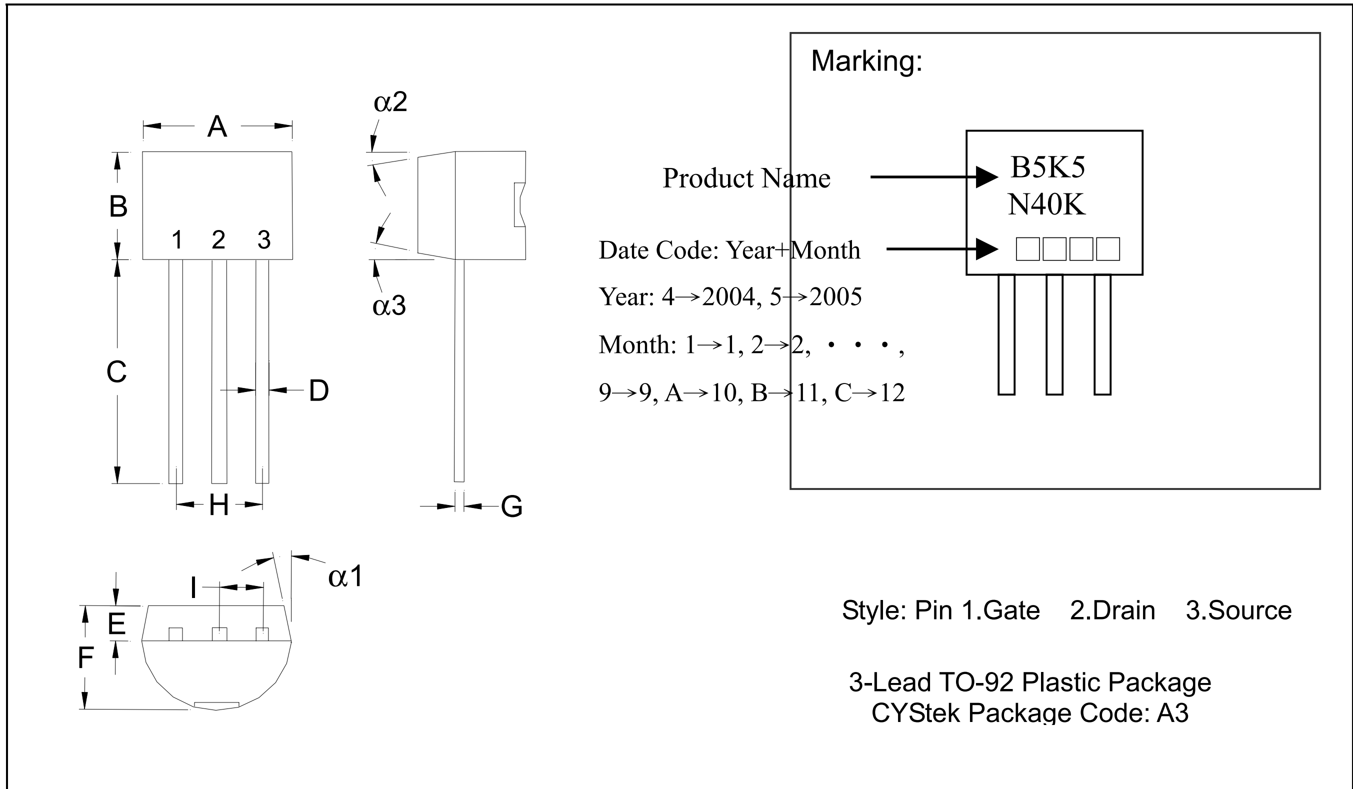
Recommended temperature profile for IR reflow



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.

TO-92 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1704	0.1902	4.33	4.83	G	0.0142	0.0220	0.36	0.56
B	0.1704	0.1902	4.33	4.83	H	-	*0.1000	-	*2.54
C	0.5000	-	12.70	-	I	-	*0.0500	-	*1.27
D	0.0142	0.0220	0.36	0.56	α1	-	*5°	-	*5°
E	-	*0.0500	-	*1.27	α2	-	*2°	-	*2°
F	0.1323	0.1480	3.36	3.76	α3	-	*2°	-	*2°

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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