100V N-Channel Enhancement Mode MOSFET

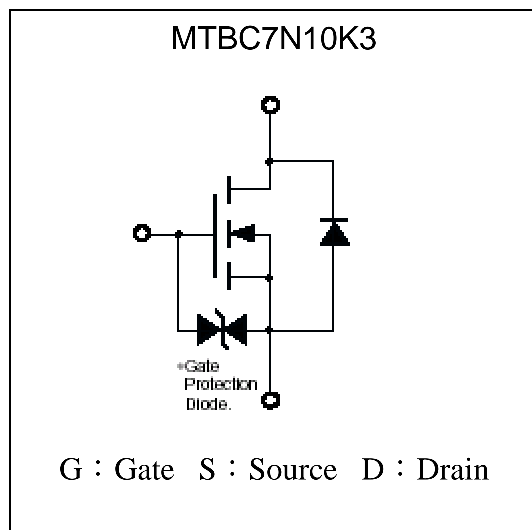
MTBC7N10K3

BV_{DSS}	100V
I_D @T_A=25°C, V_{GS}=10V	1A
$R_{DSON(TYP)}$@V_{GS}=10V, I_D=1A	389mΩ
$R_{DSON(TYP)}$@V_{GS}=4.5V, I_D=1A	413mΩ
$R_{DSON(TYP)}$@V_{GS}=4V, I_D=1A	407mΩ

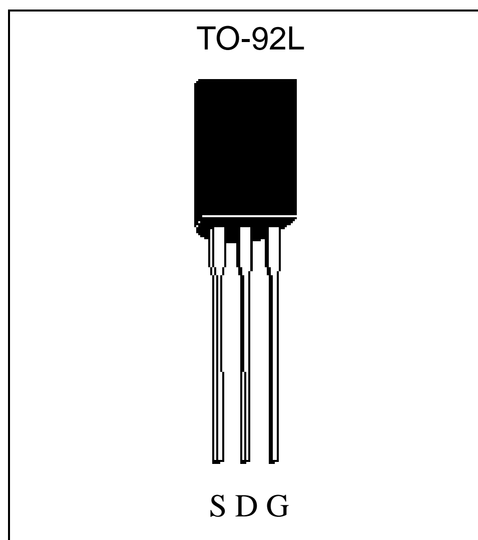
Features

- Lower gate charge.
- ESD protected gate.
- Pb-free lead plating and Halogen-free package.

Equivalent Circuit

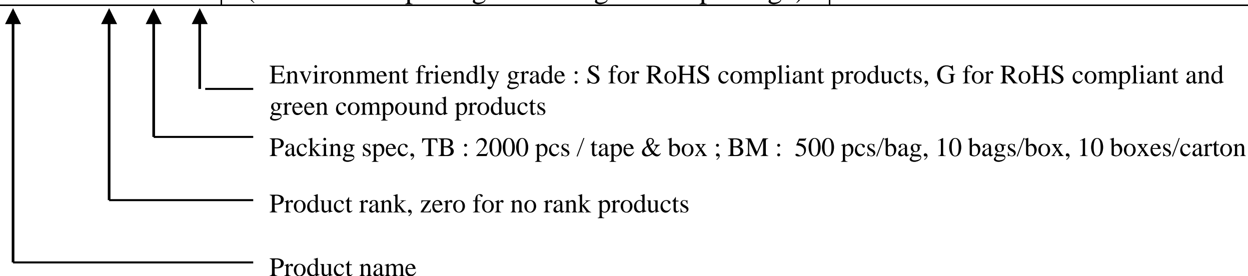


Outline



Ordering Information

Device	Package	Shipping
MTBC7N10K3-0-TB-G	TO-92L (Pb-free lead plating and halogen-free package)	2000 pcs / tape & box
MTBC7N10K3-0-BM-G	TO-92L (Pb-free lead plating and halogen-free package)	500 pcs / bag, 10 bags/box, 10 boxes/carton



Absolute Maximum Ratings (Tc=25°C, unless otherwise noted)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current	T_A=25°C, V_{GS}=10V	I_D	1	A
	T_A=70°C, V_{GS}=10V		0.8	
Pulsed Drain Current		I_{DM}	4 (Note 1 & 2)	
Power Dissipation	T_A=25°C	P_D	1	W
	T_A=70°C		0.64	
Operating Junction and Storage Temperature		Tj, Tstg	-55 ~ +150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	125	°C/W

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

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
△BV_{DSS}/△Tj	-	107	-	mV/°C	I_D=1mA, referenced to 25°C
$V_{GS(th)}$	1	-	2.5	V	V_{DS}=10V, I_D=1mA
△$V_{GS(th)}$/△Tj	-	-3	-	mV/°C	I_D=1mA, referenced to 25°C
I_{GSS}	-	-	±10	μA	V_{GS}=±16V, V_{DS}=0V
I_{DSS}	-	-	1		V_{DS}=80V, V_{GS}=0V
	-	-	10		V_{DS}=80V, V_{GS}=0V, Tj=125°C
*$R_{DS(ON)}$ [1]	-	389	520	mΩ	I_D=1A, V_{GS}=10V
	-	407	560		I_D=1A, V_{GS}=4.5V
	-	413	580		I_D=1A, V_{GS}=4V
*G_{FS} [1]	1	2.4	-	S	I_D=1A, V_{GS}=10V
Dynamic					
Ciss	-	103	150	pF	V_{DS}=25V, V_{GS}=0V, f=1MHz
Coss	-	18	27		
Crss	-	17	24		
*$t_{d(ON)}$ [1, 2]	-	3.6	7.2	ns	V_{DS}=50V, I_D=0.5A, V_{GS}=10V, R_G=10Ω
*t_r [1, 2]	-	16	24		
*$t_{d(OFF)}$ [1, 2]	-	17.2	26		
*t_f [1, 2]	-	18.8	28		

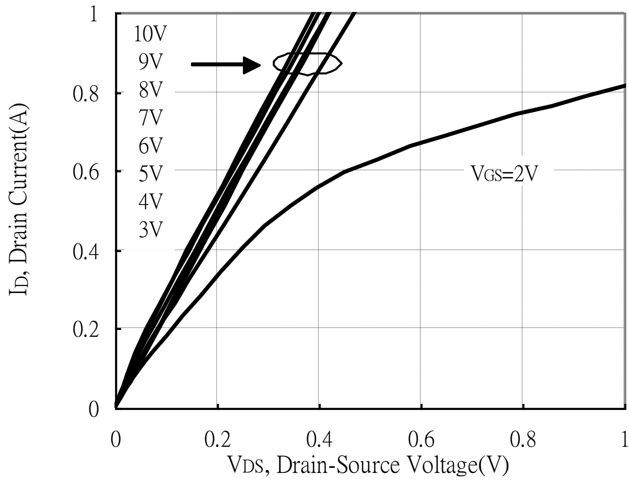
*Qg [1] [2]	-	1.6	3.2	nC	V_{DS}=50V, I_D=1A, V_{GS}=5V
*Qgs [1] [2]	-	0.8	1.6		
*Qgd [1] [2]	-	0.5	1.5		
Rg	-	18	-	Ω	f=1MHz
Source-Drain Diode					
I_S	-	-	0.8	A	
V_{SD} [1]	-	0.8	1.2	V	I_S=1A, V_{GS}=0V

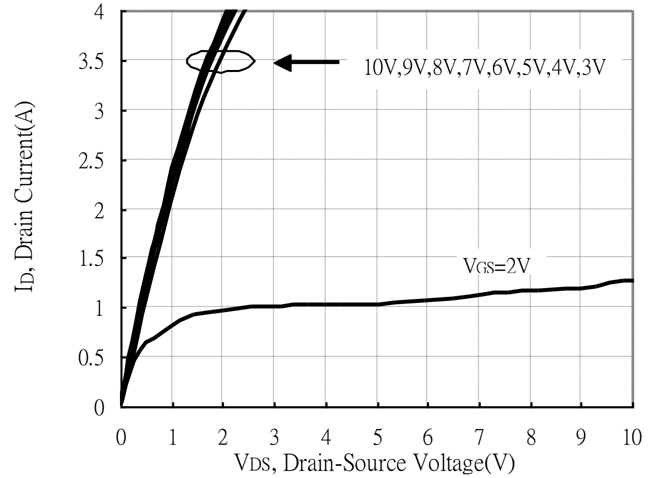
[1] Pulse test : Pulse width≤300μs, Duty cycle≤2%

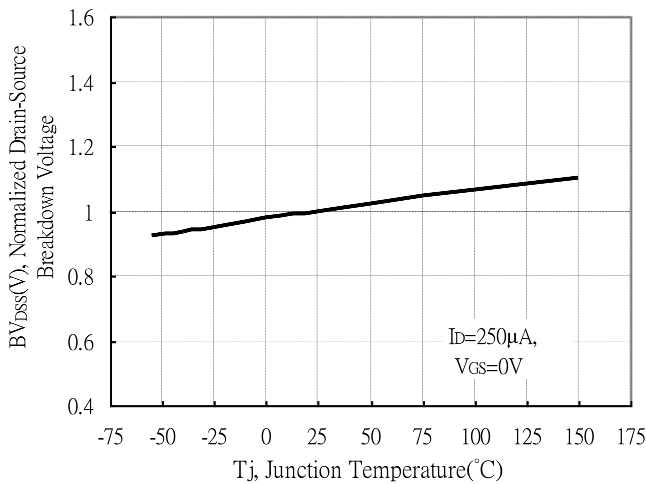
[2] Independent of operating temperature

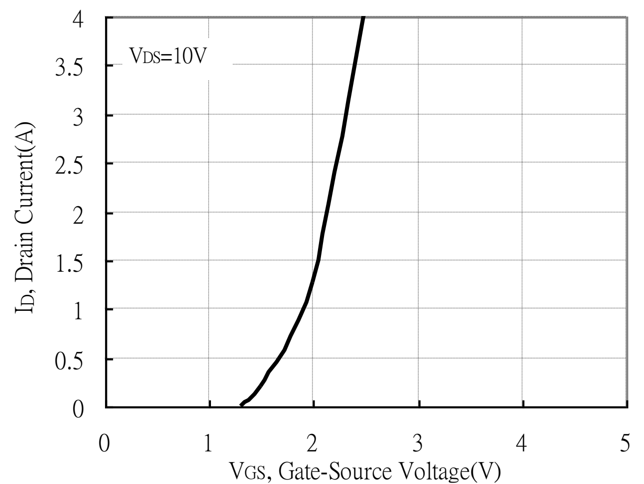
[3] Pulse width limited by maximum junction temperature

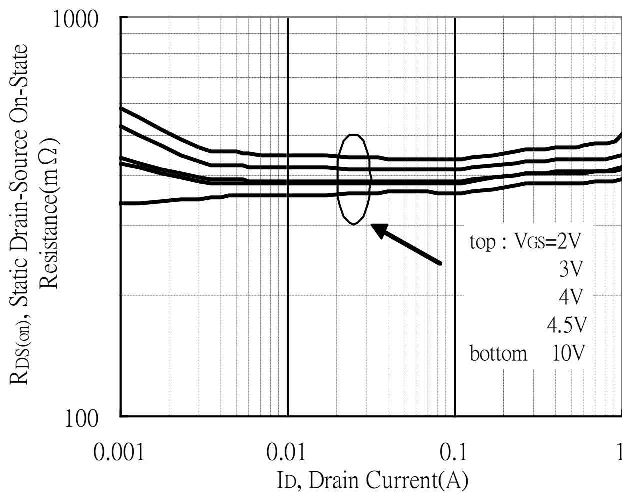
Typical Characteristics

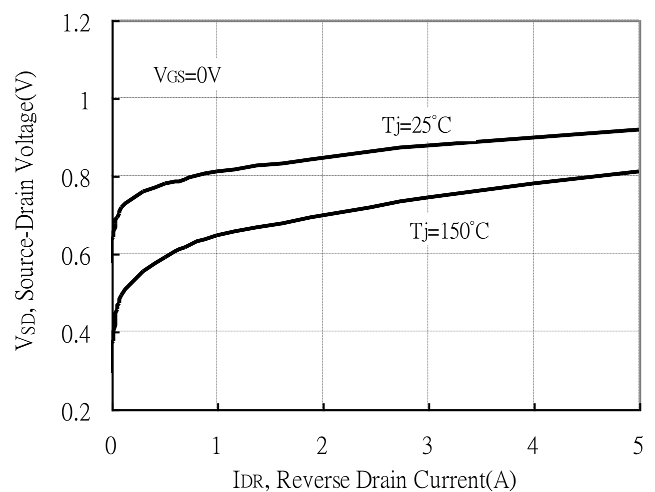




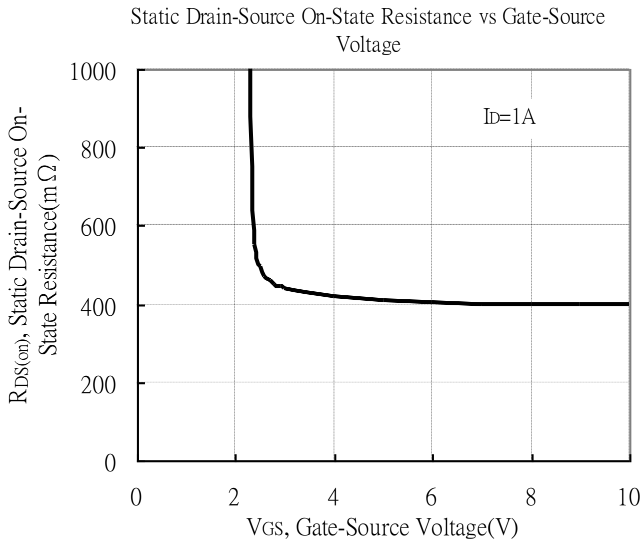


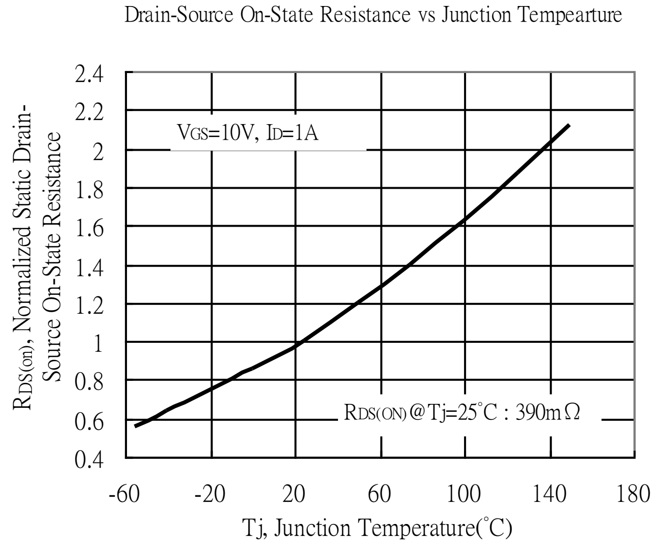


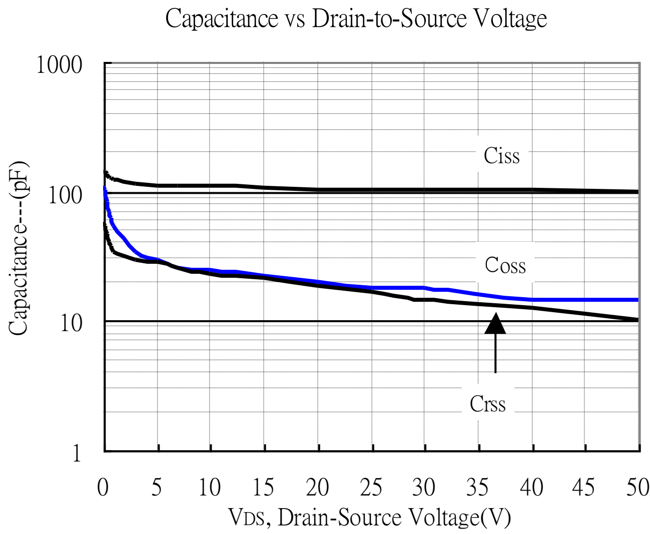


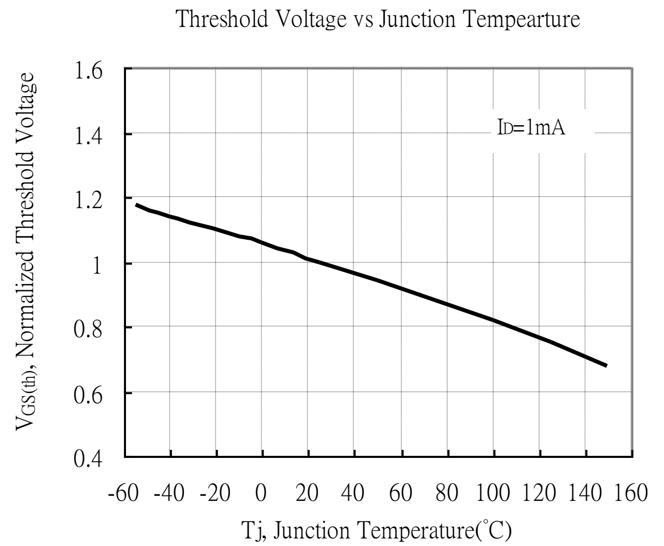


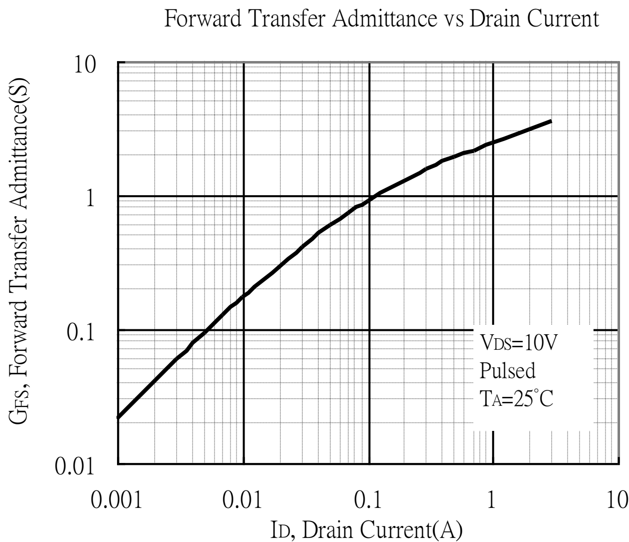
Typical Characteristics(Cont.)

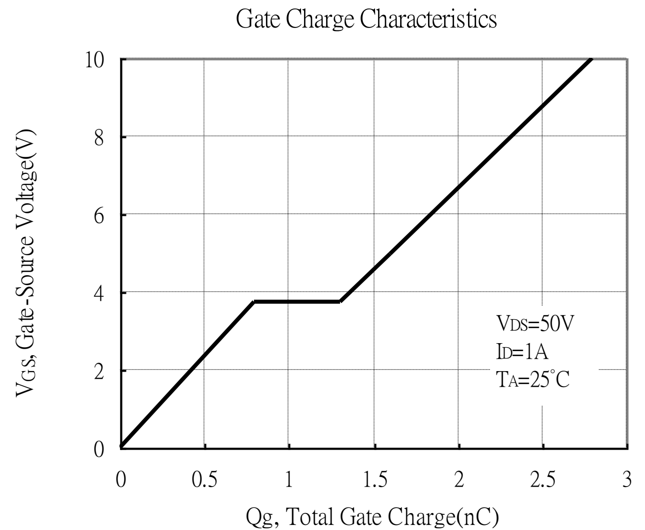




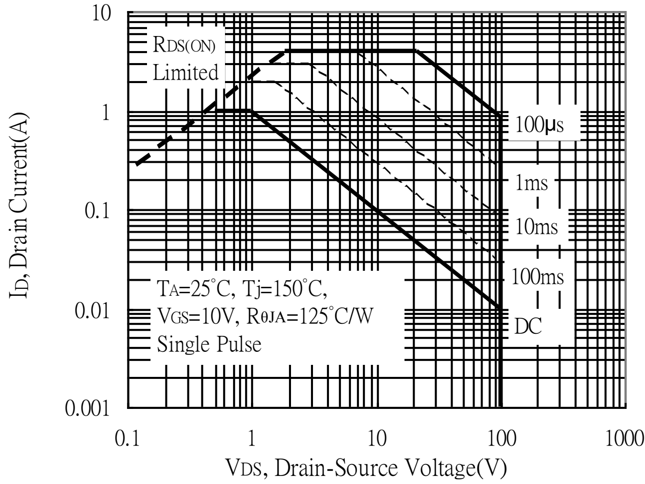


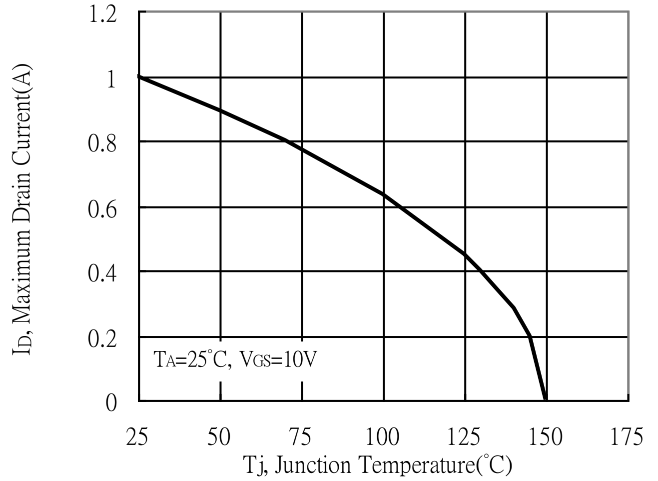


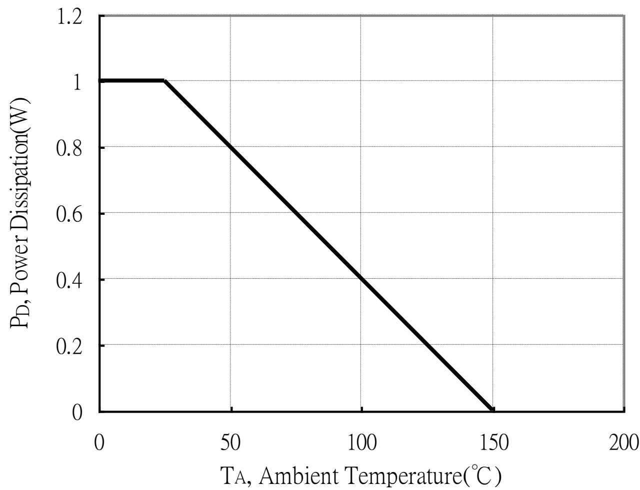


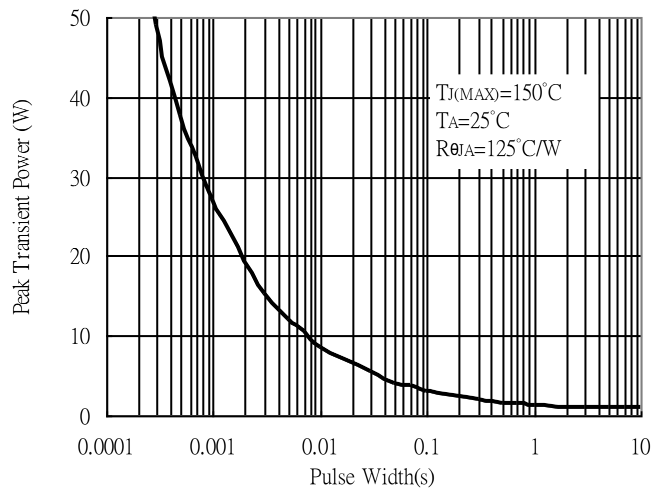


Typical Characteristics(Cont.)

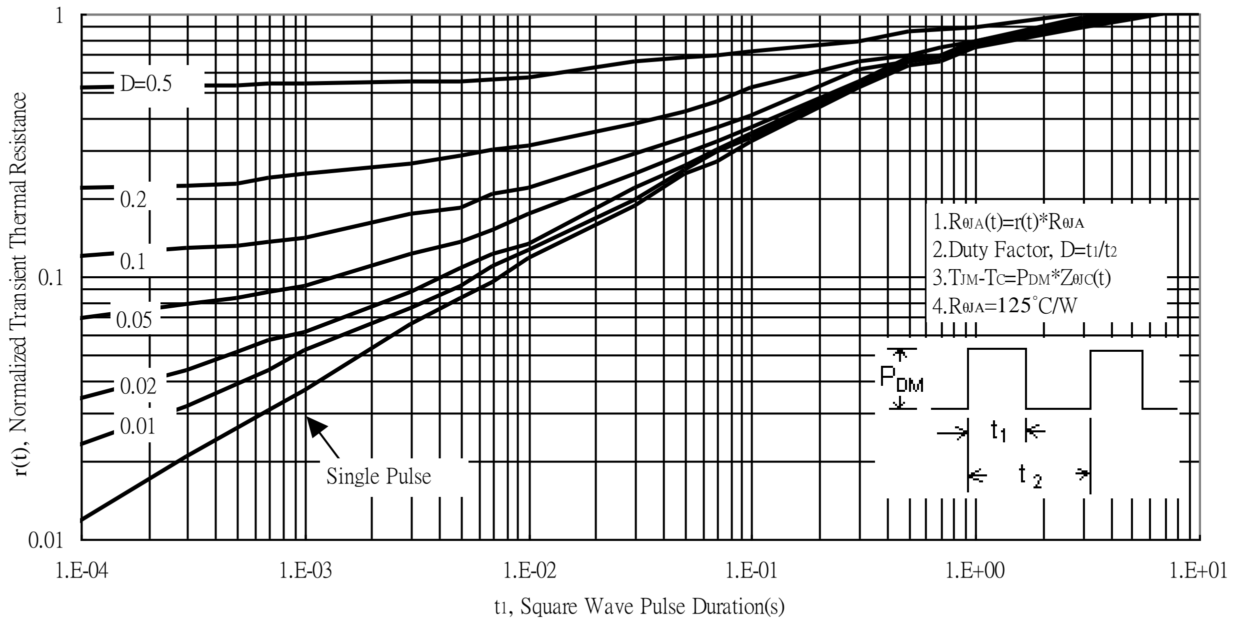




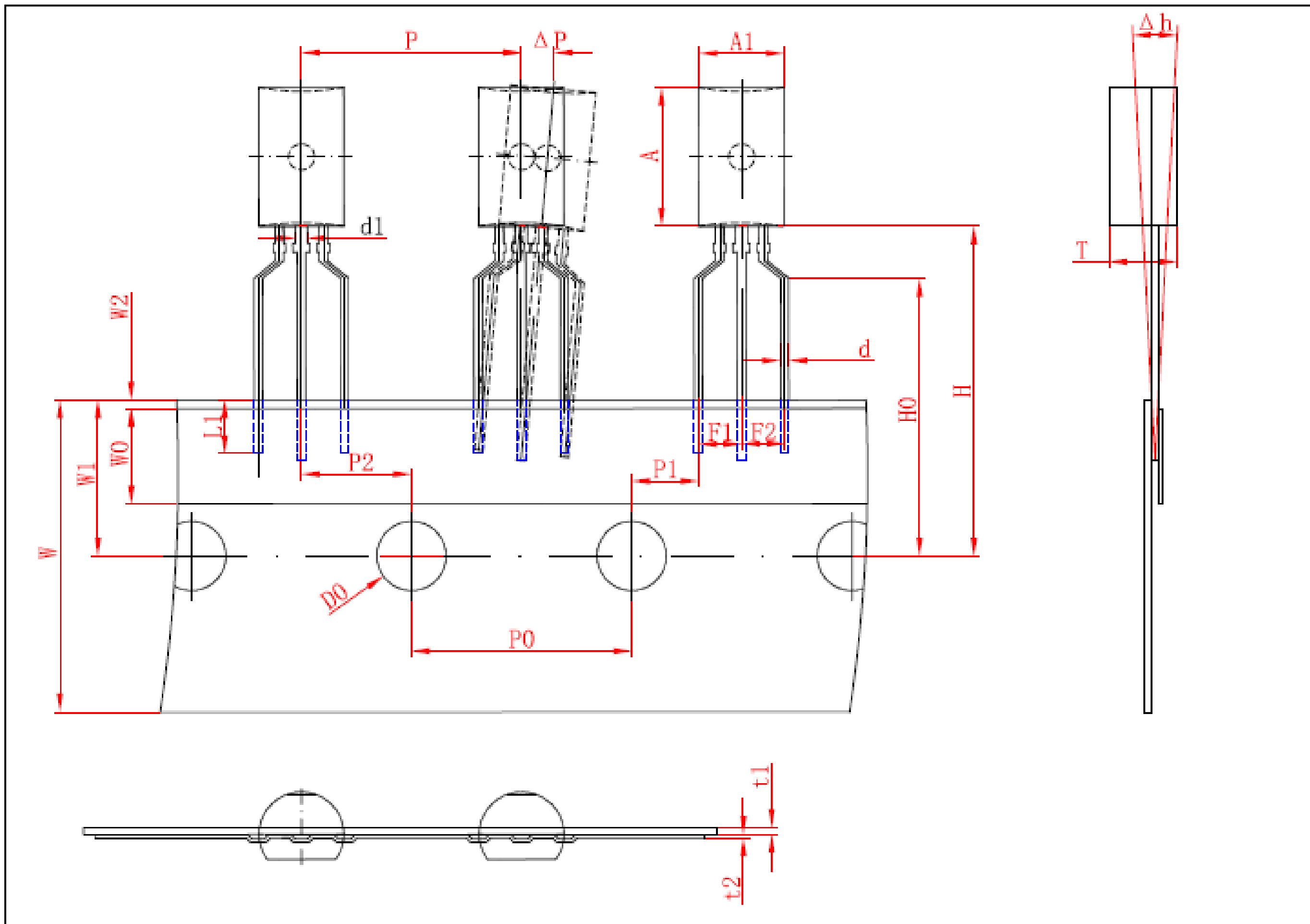




Typical Characteristics(Cont.)



TO-92L Taping Outline

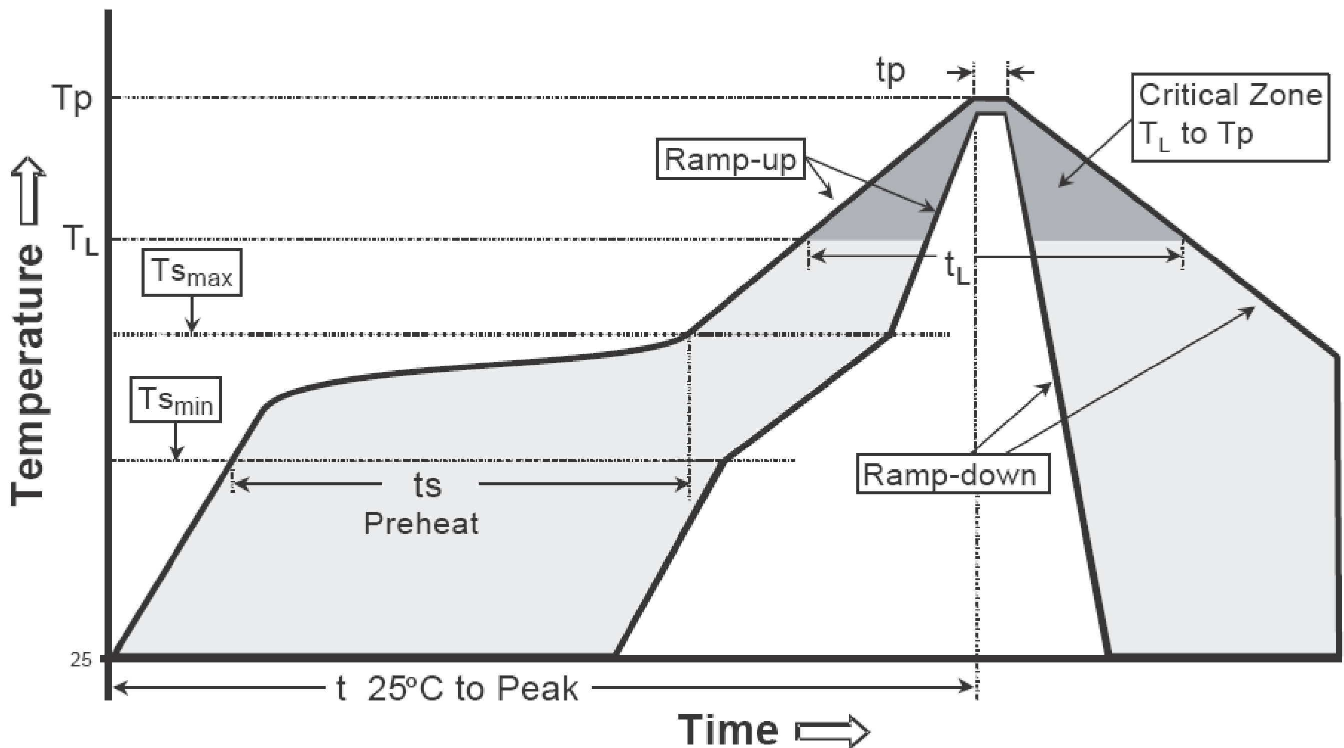


DIM	Item	Millimeters	
		Min.	Max.
A1	Component body width	4.70	5.10
A	Component body height	7.80	8.20
T	Component body thickness	3.70	4.10
d	Lead wire diameter	0.35	0.55
d1	Lead wire diameter 1	0.60	0.80
P	Pitch of component	12.40	13.00
P0	Feed hole pitch	12.50	12.90
P2	Hole center to component center	6.05	6.65
F1, F2	Lead to lead distance	2.20	2.80
△h	Component alignment, F-R	-1.00	1.00
W	Tape width	17.50	19.00
W0	Hole down tape width	5.50	6.50
W1	Hole position	8.50	9.50
W2	Hole down tape position	-	1.00
H	Height of component from tape center	19.00	21.00
H0	Lead wire clinch height	15.50	16.50
L1	Lead wire (tape portion)	2.50	-
D0	Feed hole diameter	3.80	4.20
t1	Taped lead thickness	0.35	0.45
t2	Carrier tape thickness	0.15	0.25
P1	Position of hole	3.55	4.15
△P	Component alignment	-1.00	1.00

Recommended wave soldering condition

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

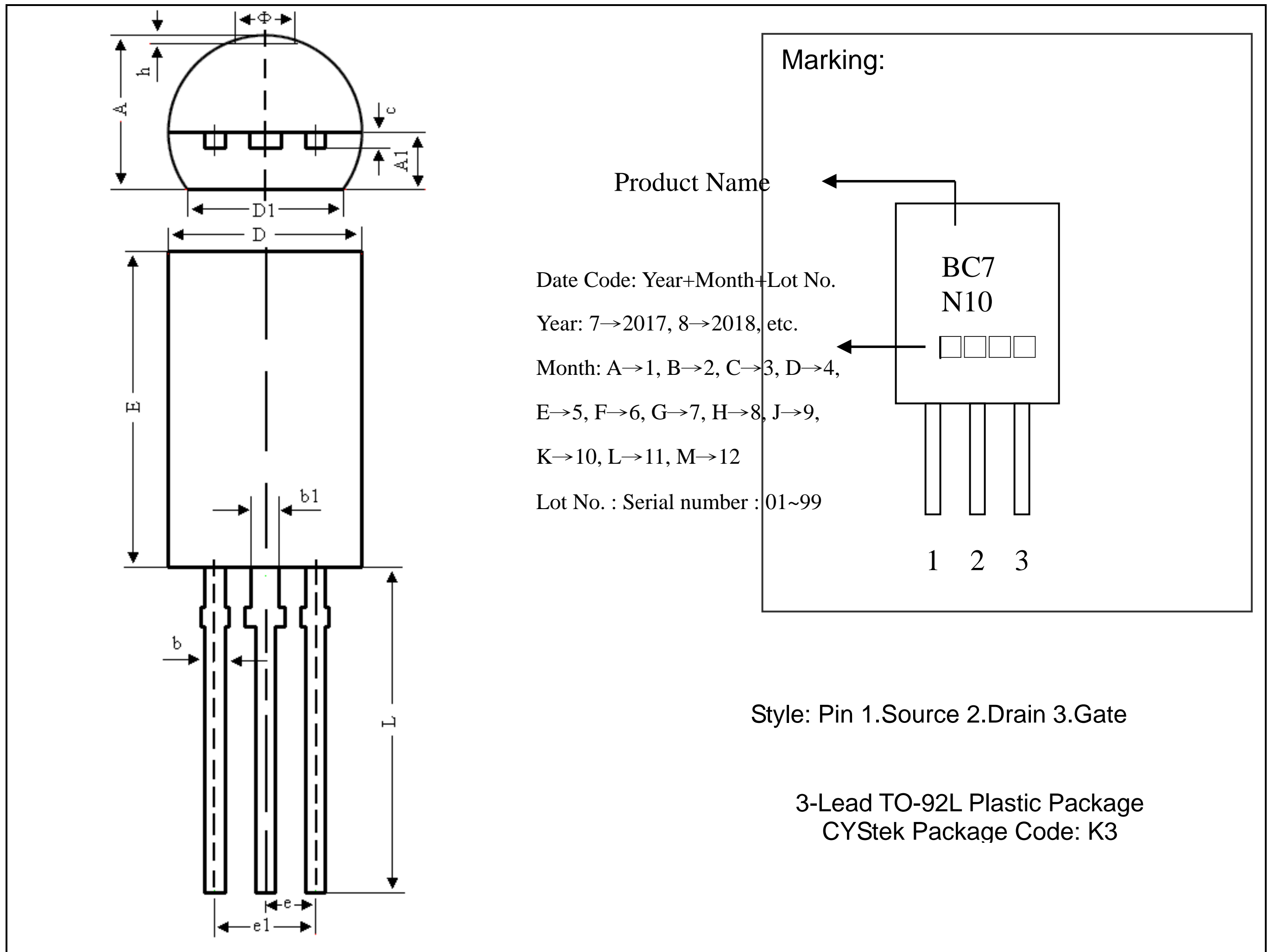
Recommended temperature profile for IR reflow



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.

TO-92L Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.146	0.161	3.700	4.100	E	0.307	0.323	7.800	8.200
A1	0.050	0.062	1.280	1.580	e	*0.05		*1.270	
b	0.014	0.022	0.350	0.550	e1	0.096	0.104	2.440	2.640
b1	0.024	0.031	0.600	0.800	L	0.543	0.559	13.800	14.200
c	0.014	0.018	0.350	0.450	φ	-	0.063	-	1.600
D	0.185	0.201	4.700	5.100	h	0.000	0.012	0.000	0.300
D1	0.157	-	4.000	-					

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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek ***semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.***
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.