

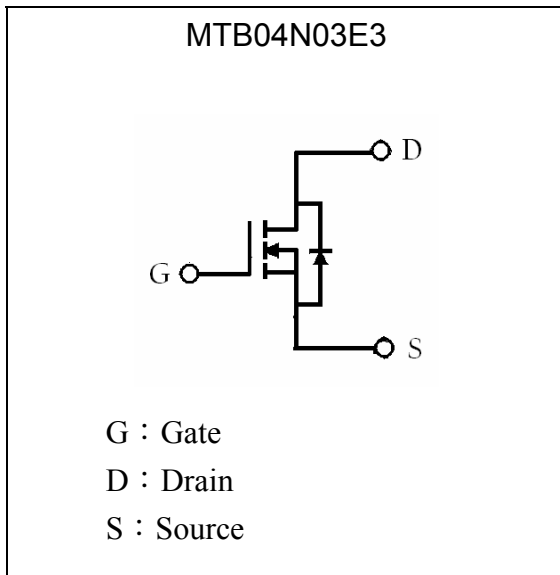
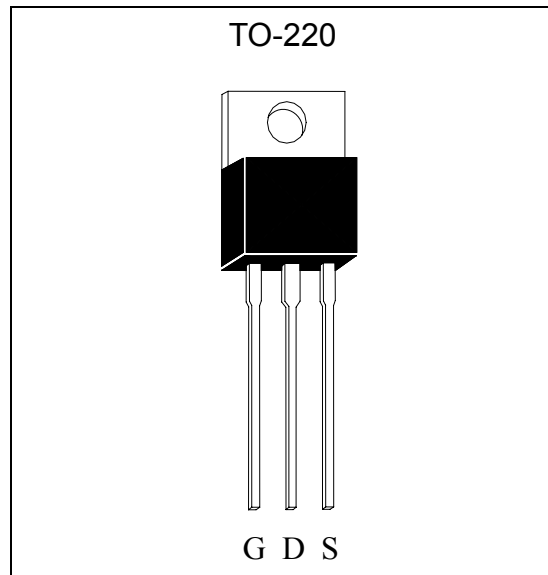
N-Channel Enhancement Mode Power MOSFET

MTB04N03E3

BV_{DSS}		30V
I_D		115A
$R_{DSON(TYP)}$	$V_{GS}=10V, I_D=30A$	3.8m Ω
	$V_{GS}=4.5V, I_D=24A$	6.1m Ω

Features

- Simple Drive Requirement
- Repetitive Avalanche Rated
- Fast Switching Characteristic
- Pb-free lead plating and RoHS compliant package

Symbol

Outline

Absolute Maximum Ratings ($T_a=25^\circ\text{C}$)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current @ $V_{GS}=10V, T_c=25^\circ\text{C}$		I_D	115	A
Continuous Drain Current @ $V_{GS}=10V, T_c=100^\circ\text{C}$		I_D	81	
Pulsed Drain Current		I_{DM}	460 *1	
Avalanche Current		I_{AS}	26	
Avalanche Energy	$L=2\text{mH}, I_D=26A, V_{DD}=25V$	E_{AS}	576	mJ
Repetitive Avalanche Energy	$L=0.05\text{mH}$	E_{AR}	25	
Total Power Dissipation	$T_c=25^\circ\text{C}$	P_D	107	W
	$T_c=100^\circ\text{C}$		53	
Operating Junction and Storage Temperature		T_j, T_{stg}	-55~+175	$^\circ\text{C}$

Note : *1. Pulse width limited by maximum junction temperature.



Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{th,j-c}	1.4	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{th,j-a}	62.5	°C/W

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
B _V DSS	30	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	1	2.2	3		V _{DS} = V _{GS} , I _D =250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±20, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =30V, V _{GS} =0V
	-	-	25		V _{DS} =30V, V _{GS} =0V, T _j =125°C
*R _{DS(ON)}	-	3.8	5	mΩ	V _{GS} =10V, I _D =30A
	-	6.1	8		V _{GS} =4.5V, I _D =24A
*G _{FS}	-	39	-	S	V _{DS} =5V, I _D =20A
Dynamic					
*Q _g (V _{GS} =10V)	-	50	-	nC	V _{DS} =15V, I _D =30A, V _{GS} =10V
*Q _g (V _{GS} =5V)	-	31	-		
*Q _{gs}	-	10	-		
*Q _{gd}	-	18	-		
*t _{d(ON)}	-	12	-	ns	V _{DS} =15V, I _D =25A, V _{GS} =10V, R _{GS} =2.7Ω
*t _r	-	10	-		
*t _{d(OFF)}	-	43	-		
*t _f	-	13	-		
C _{iss}	-	2466	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
C _{oss}	-	432	-		
C _{rss}	-	298	-		
Source-Drain Diode					
*I _S	-	-	115	A	
*I _{SM}	-	-	460		
*V _{SD}	-	0.96	1.2	V	I _F =75A, V _{GS} =0V
*t _{rr}	-	35	-	ns	I _F =30A, V _{GS} =0V, dI _F /dt=100A/μs
*Q _{rr}	-	28	-	nC	

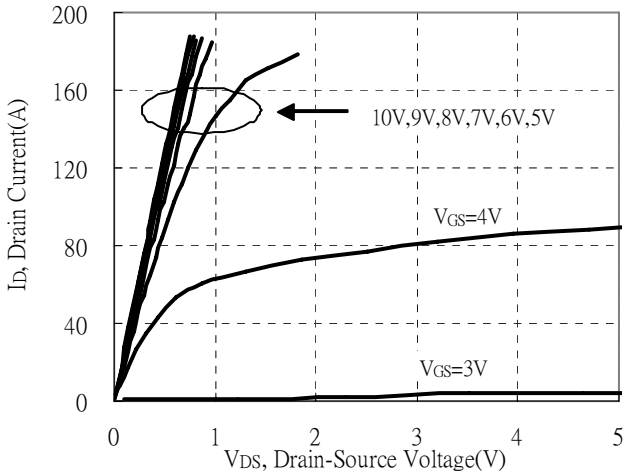
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

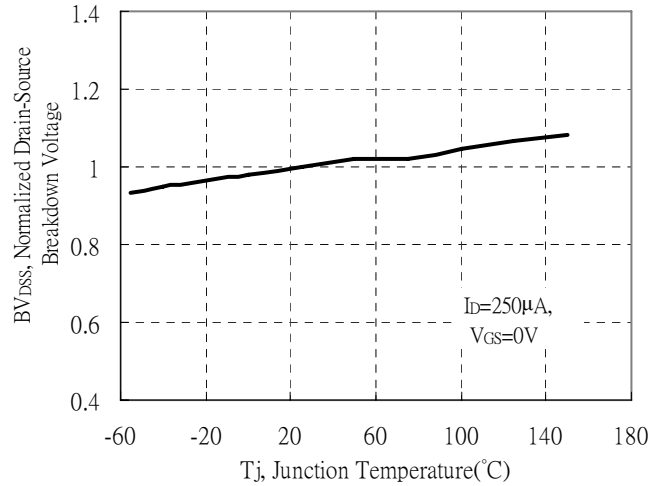
Device	Package	Shipping
MTB04N03E3-0-UB-S	TO-220 (Pb-free lead plating and RoHS compliant package)	50 pcs/tube, 20 tubes/box, 4 boxes / carton

Typical Characteristics

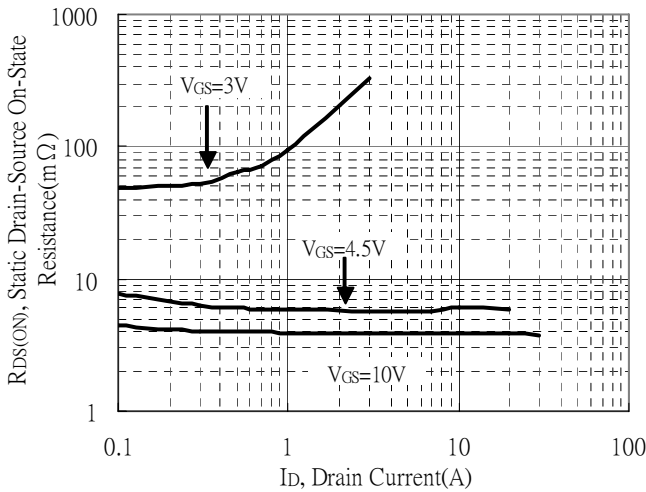
Typical Output Characteristics



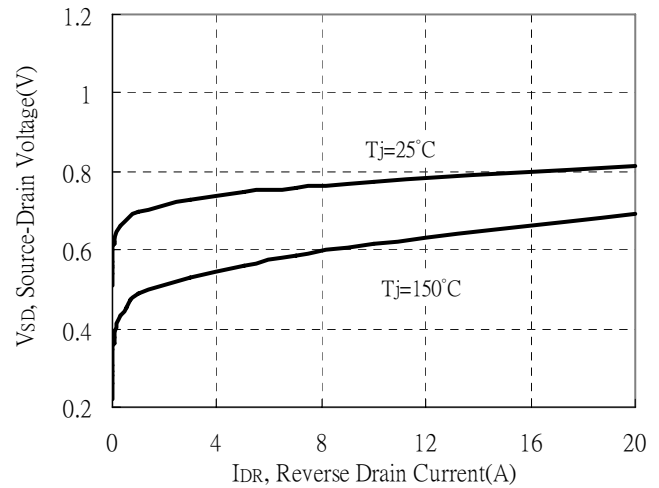
Brekdown Voltage vs Junction Temperature



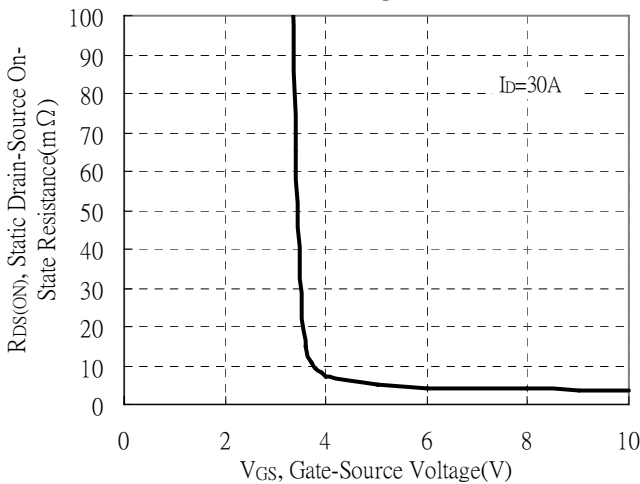
Static Drain-Source On-State resistance vs Drain Current



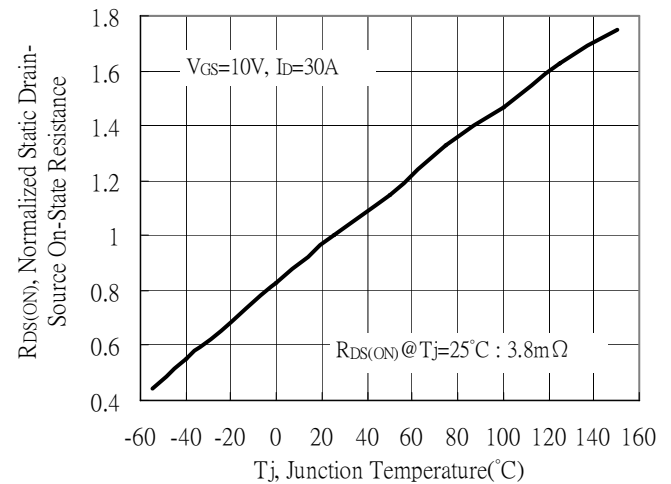
Reverse Drain Current vs Source-Drain Voltage



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

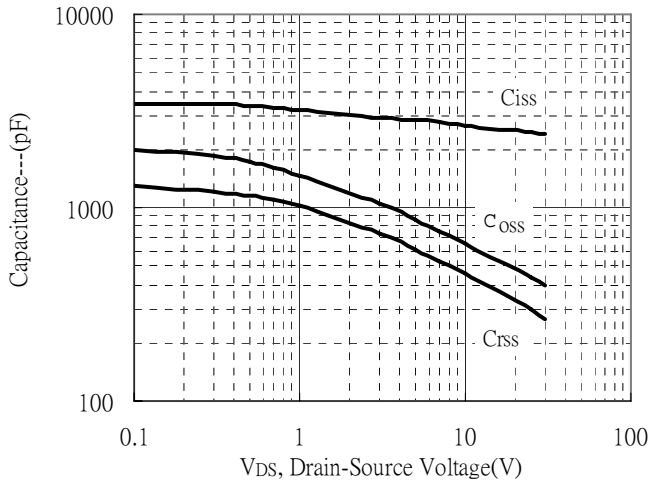


Drain-Source On-State Resistance vs Junction Temperature

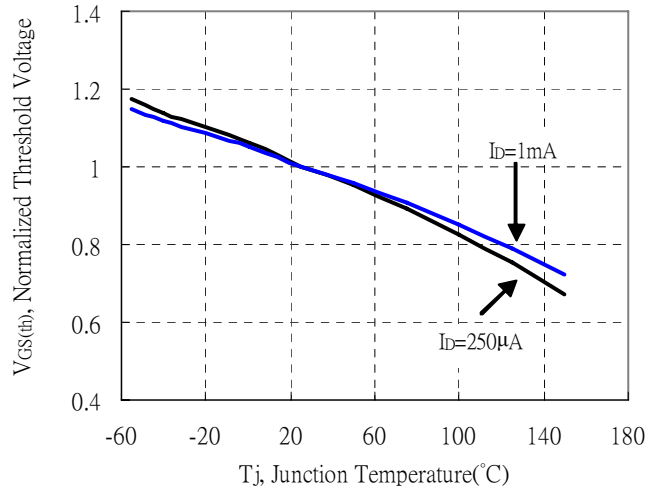


Typical Characteristics(Cont.)

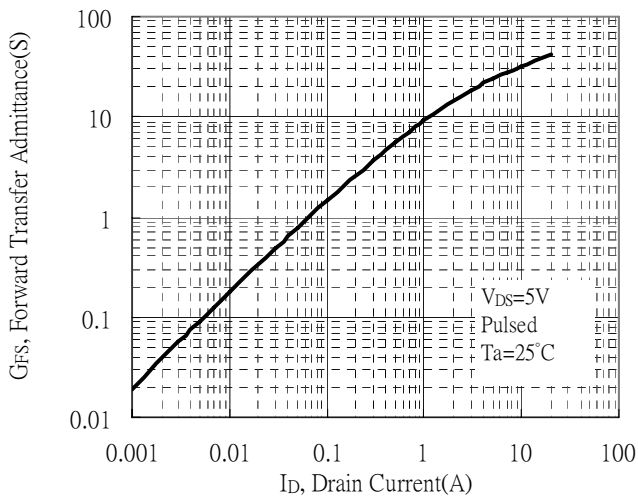
Capacitance vs Drain-to-Source Voltage



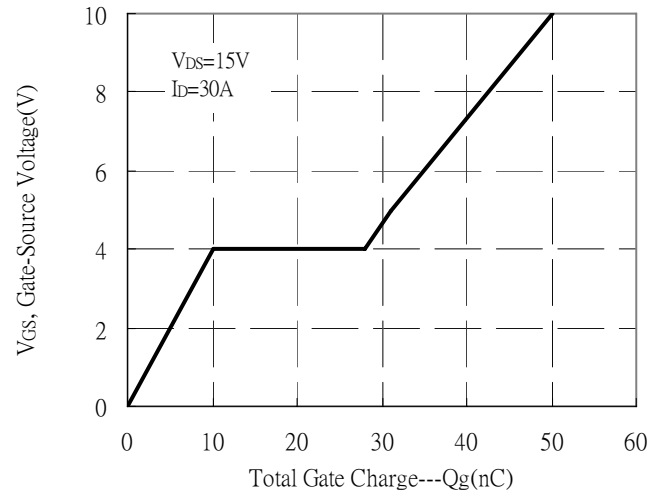
Threshold Voltage vs Junction Temperature



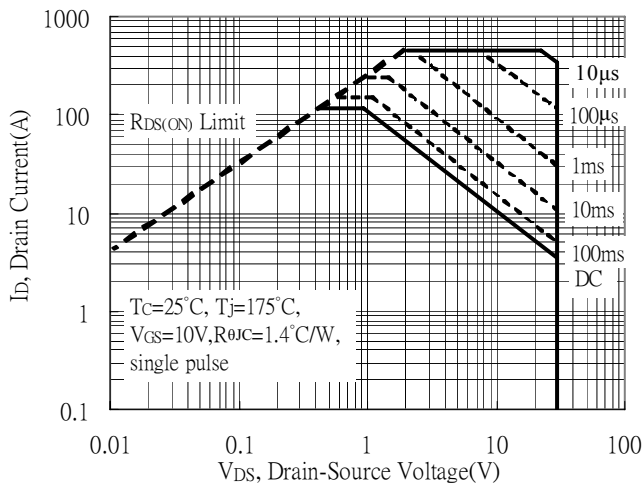
Forward Transfer Admittance vs Drain Current



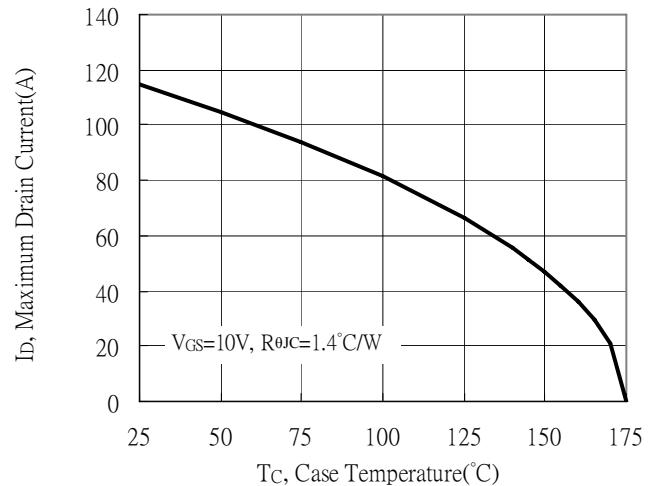
Gate Charge Characteristics



Maximum Safe Operating Area

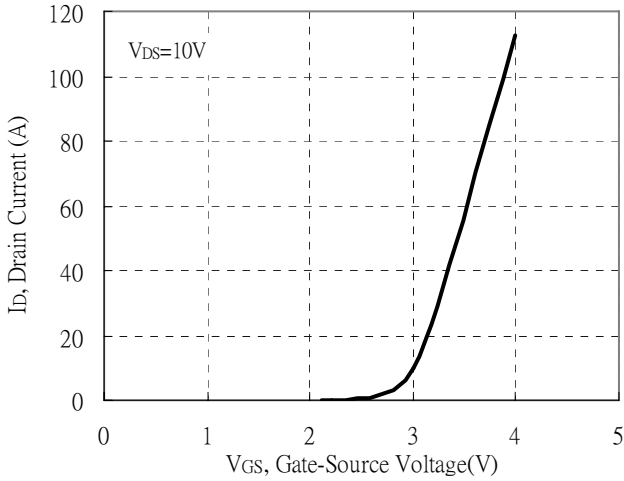


Maximum Drain Current vs Case Temperature

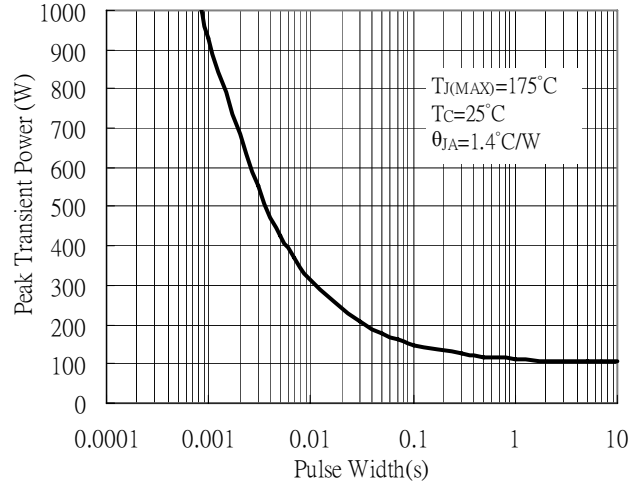


Typical Characteristics(Cont.)

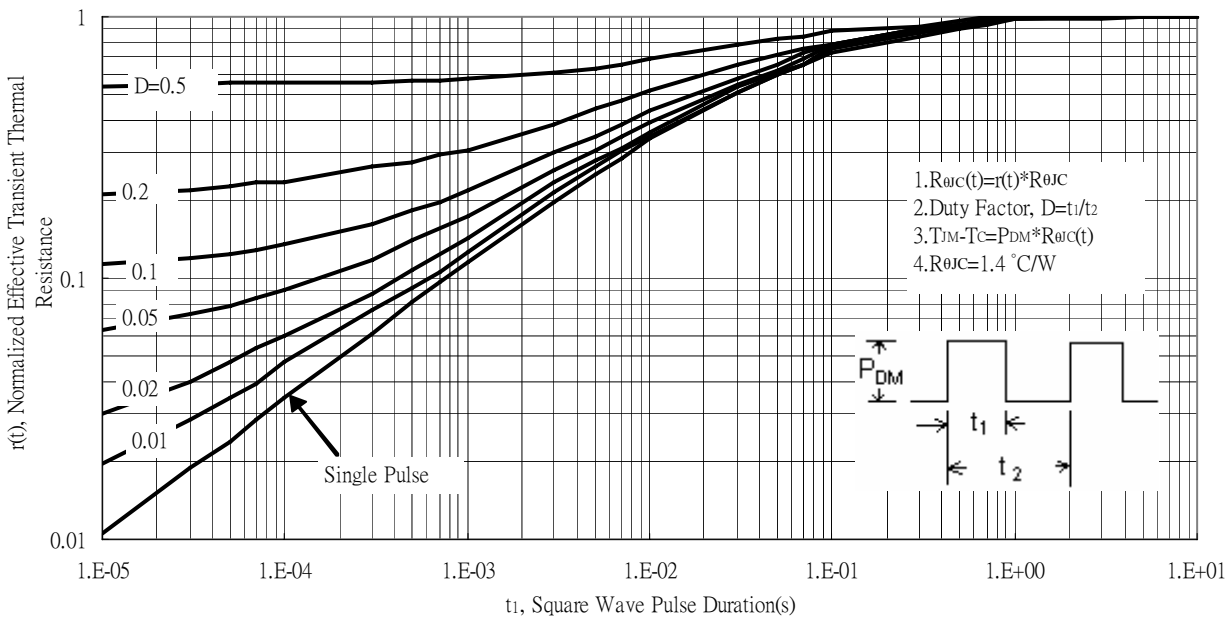
Typical Transfer Characteristics



Single Pulse Maximum Power Dissipation



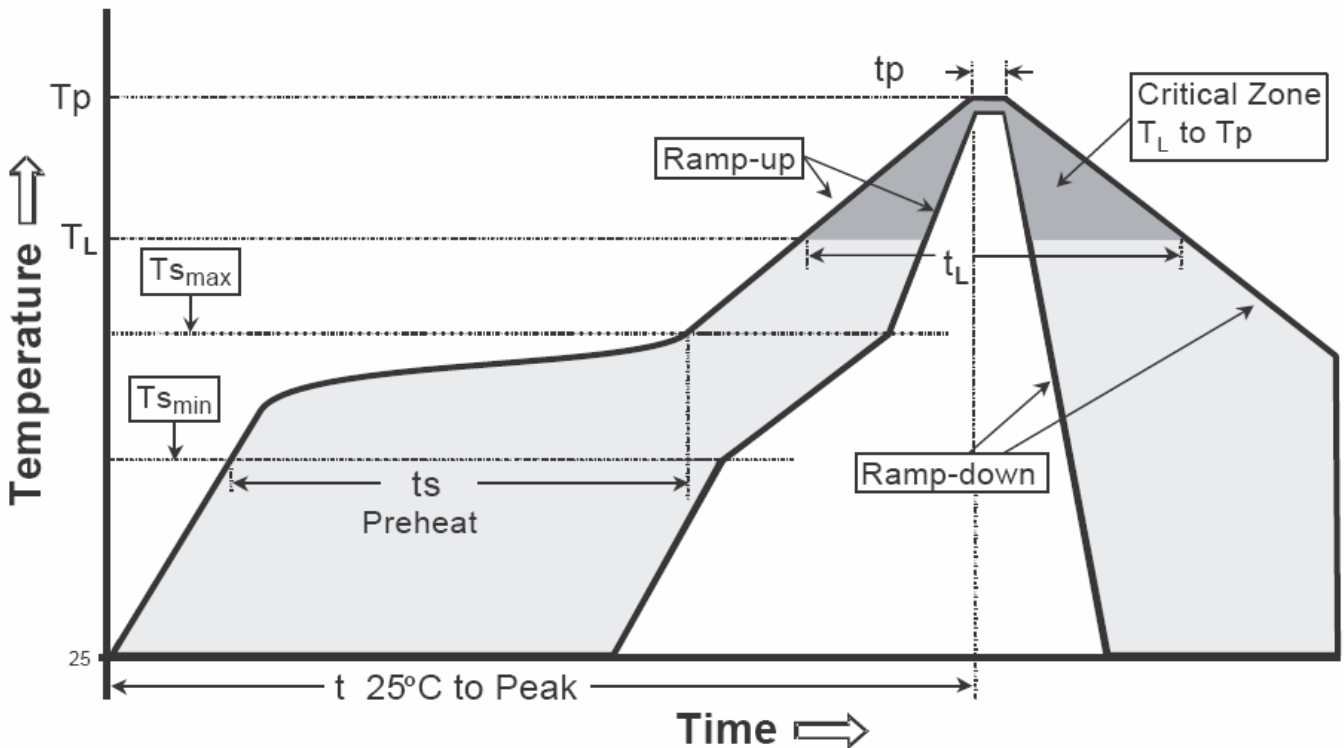
Transient Thermal Response Curves



Recommended wave soldering condition

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

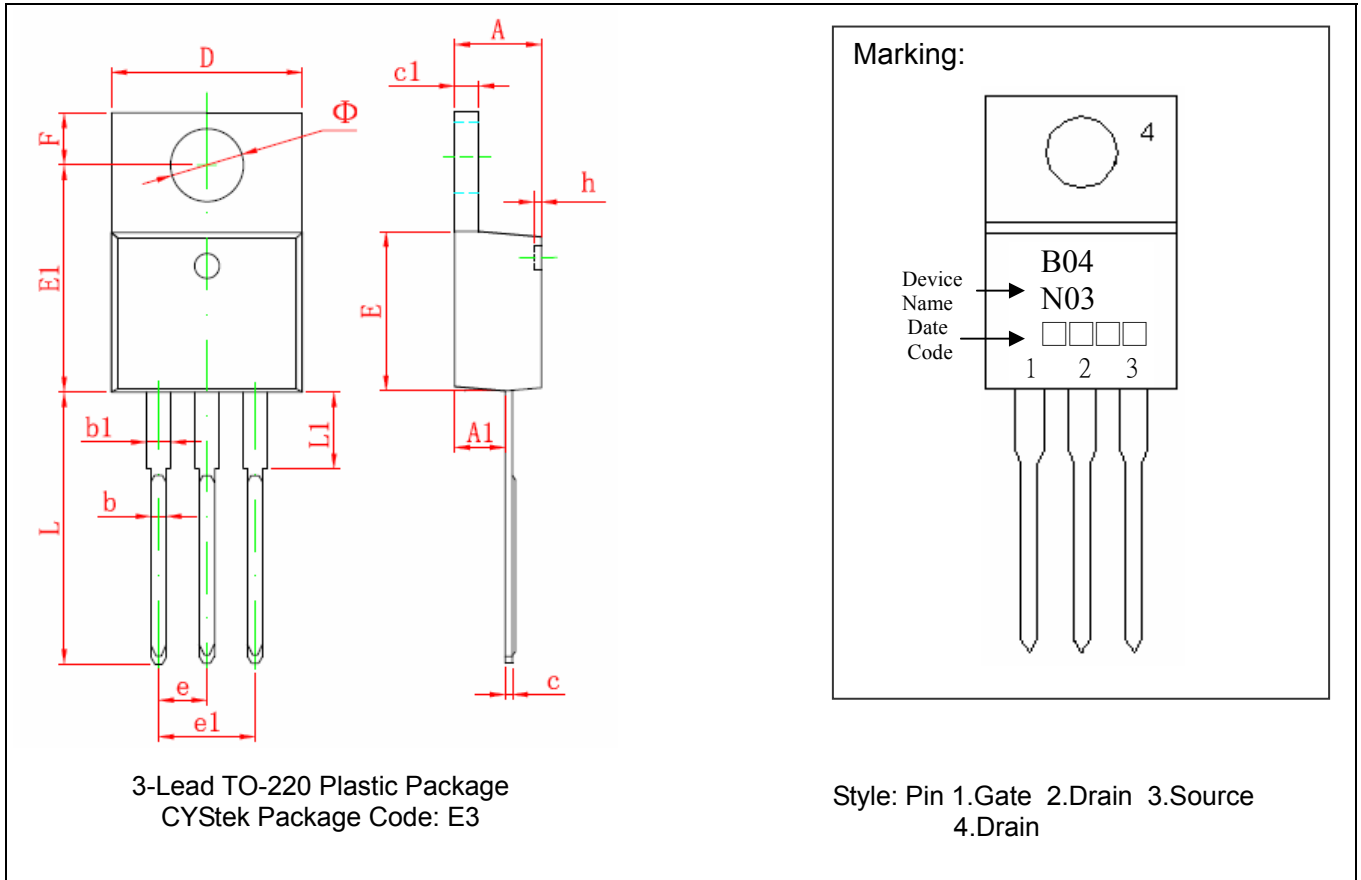
Recommended temperature profile for IR reflow



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)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)	183°C	217°C
- Time (tL)	60-150 seconds	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.

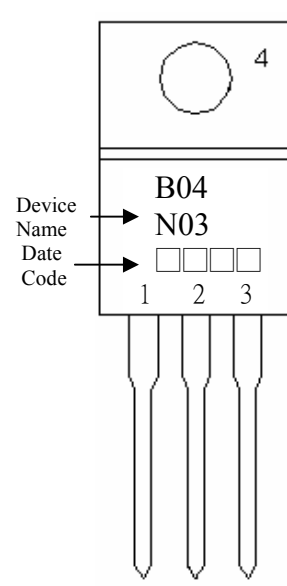
Note : All temperatures refer to topside of the package, measured on the package body surface.

TO-220 Dimension



The diagram shows two views of a 3-lead TO-220 plastic package. The left view is a top-down perspective showing dimensions D (width), F (hole diameter), E1 (height to lead base), L (total height), b1 (lead width), b (lead thickness), e (lead spacing), e1 (lead width at base), and L1 (lead length). The right view is a side profile showing dimensions A (lead length), c1 (lead thickness), h (height to lead base), E (height to body top), A1 (lead length at base), and c (lead thickness at base). A circular hole with diameter Φ is also indicated.

Marking:



Device Name → B04
 Date Code → [] [] []
 1 2 3

3-Lead TO-220 Plastic Package
 CYStek Package Code: E3

Style: Pin 1.Gate 2.Drain 3.Source
 4.Drain

*: Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184	E1	12.060	12.460	0.475	0.491
A1	2.520	2.820	0.099	0.111	e	2.540*		0.100*	
b	0.710	0.910	0.028	0.036	e1	4.980	5.180	0.196	0.204
b1	1.170	1.370	0.046	0.054	F	2.590	2.890	0.102	0.114
c	0.310	0.530	0.012	0.021	h	0.000	0.300	0.000	0.012
c1	1.170	1.370	0.046	0.054	L	13.400	13.800	0.528	0.543
D	10.010	10.310	0.394	0.406	L1	3.560	3.960	0.140	0.156
E	8.500	8.900	0.335	0.350	Φ	3.735	3.935	0.147	0.155

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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