N-Channel Enhancement Mode Power MOSFET

MTN50N06E3

BV_{DSS}	60V
$R_{DSON(MAX)}$	22 mΩ
I_D	50A

Description

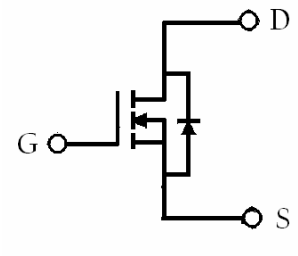
The MTN50N06E3 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness.
The TO-220 package is universally preferred for all commercial-industrial applications

Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

Symbol

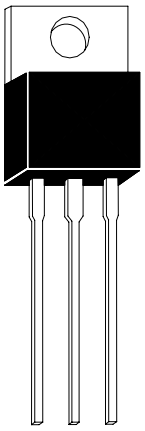
MTN50N06E3



G：Gate
D：Drain
S：Source

Outline

TO-220



G D S

Absolute Maximum Ratings (T_C=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current		I_D	50	A
Continuous Drain Current @T_C=100°C		I_D	35	A
Pulsed Drain Current @ V_{GS}=10V	(Note 1)	I_{DM}	200	A
Avalanche Current	(Note 1)	I_{AR}	50	A
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	500	mJ
Repetitive Avalanche Energy	(Note 1)	E_{AR}	12	
Peak Diode Recovery dV/dt	(Note 3)	dV/dt	4.5	V/ns
Total Power Dissipation (T_C=25℃)		Pd	120	W
Linear Derating Factor			0.8	W/°C
Operating Junction and Storage Temperature		Tj, Tstg	-65~+175	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	°C

Note : *1. Pulse width limited by maximum junction temperature.
*2. L=200μH, I_{AS}=50A,V_{DD}=30V, starting T_J=+25℃
*3. I_{SD}≤50A, dI/dt<100A/μs, V_{DD}≤BV_{DSS}, T_J≤Tj(max).

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	1.24	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	62.5	°C/W

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	60	-	-	V	V_{GS}=0, I_D=250μA
$V_{GS(th)}$	2.0	2.8	4.0		V_{DS} = V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20
I_{DSS}	-	-	5	μA	V_{DS} =60V, V_{GS} =0
	-	-	25		V_{DS} =48V, V_{GS} =0, Tj=125°C
I_{DON}	50	-	-	A	V_{DS} =10V, V_{GS}=10V (Note 1)
$R_{DS(ON)}$	-	19	22	mΩ	V_{GS} =10V, I_D=30A (Note 1)
G_{FS}	-	28	-	S	V_{DS} =10V, I_D=25A (Note 1)
Dynamic					
Qg	-	29	-	nC	V_{DS}=48V, I_D=50A, V_{GS}=10V (Note 1 & 2)
Qgs	-	7	-		
Qgd	-	9	-		
$t_{d(ON)}$	-	53	-	ns	V_{DS}=30V, I_D=25A, V_{GS}=10V, R_{GS}=50Ω (Note 1 & 2)
tr	-	58	-		
$t_{d(OFF)}$	-	118	-		
t_f	-	60	-		
Ciss	-	1565	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Coss	-	364	-		
Crss	-	77	-		
Source-Drain Diode					
I_S	-	-	50	A	
I_{SM}	-	-	200		(Note 3)
V_{SD}	-	0.88	1.5	V	I_S=25A, V_{GS}=0V (Note 1)
trr	-	52	-	ns	V_{GS}=0, I_F=50A, dI_F/dt=100A/μs
Qrr	-	75	-	nC	

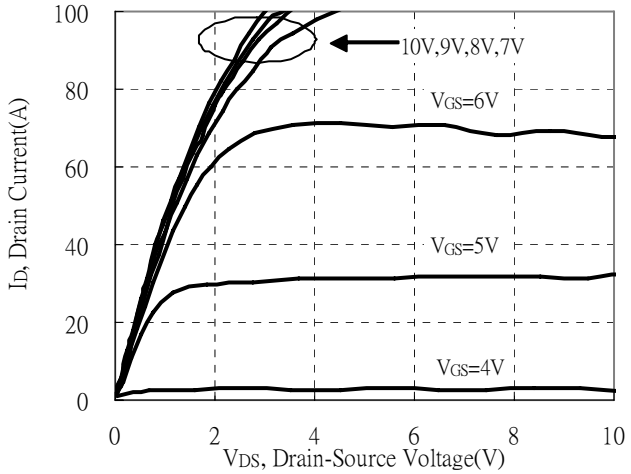
Note : 1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
2. Independent of operating temperature
3. Pulse width limited by maximum junction temperature.

Ordering Information

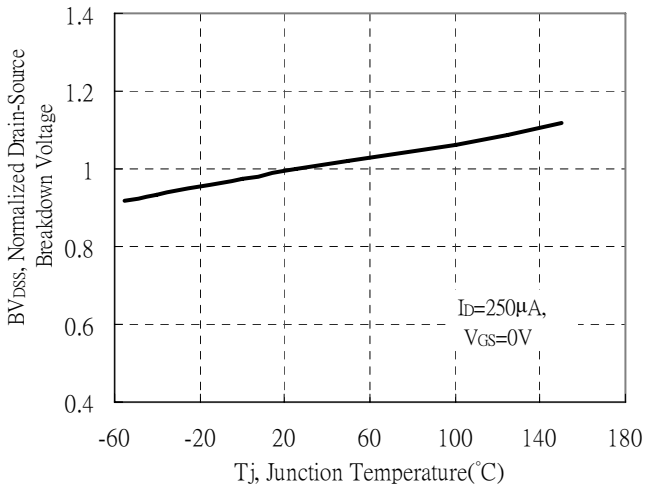
Device	Package	Shipping	Marking
MTN50N06E3-0-UB-S	TO-220 (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton	50N06

Typical Characteristics

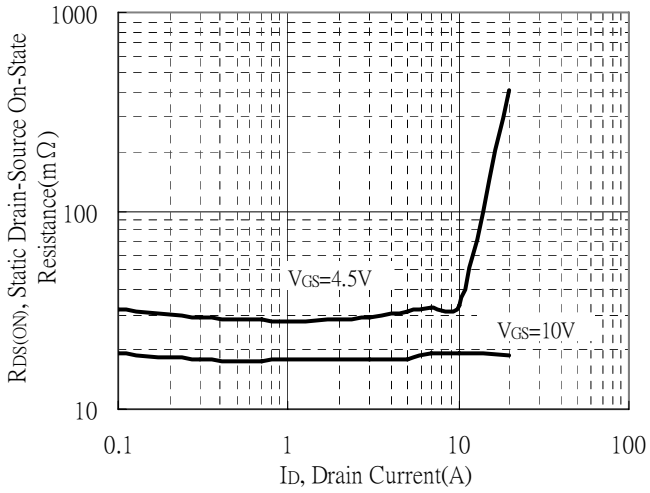
Typical Output Characteristics



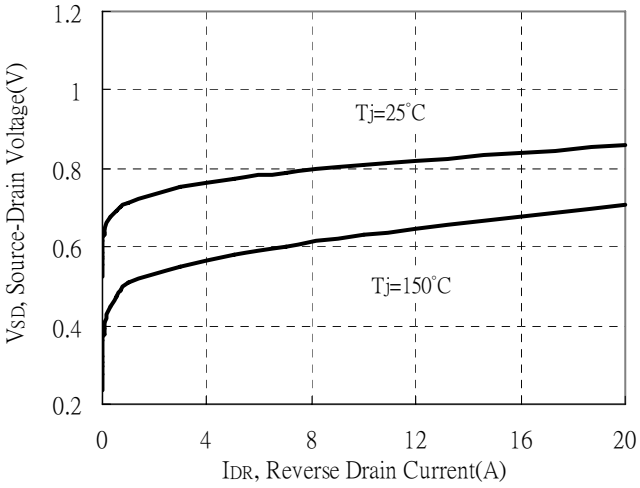
Brekdown Voltage vs Junction Temperature



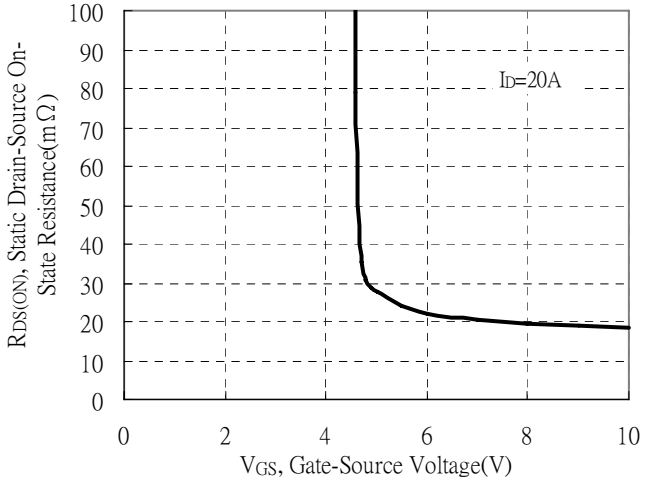
Static Drain-Source On-State resistance vs Drain Current



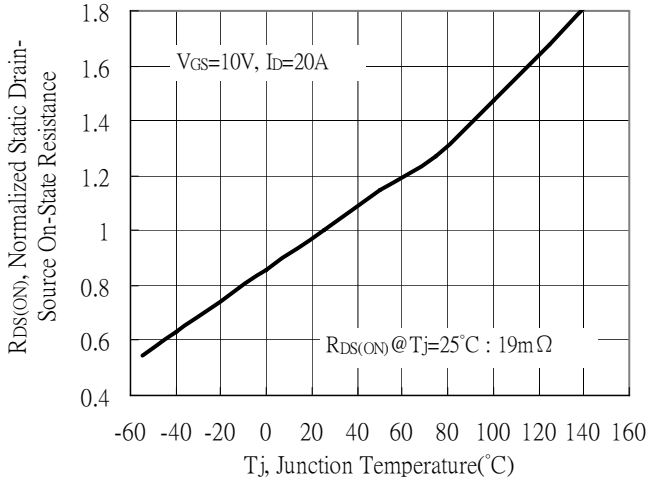
Reverse Drain Current vs Source-Drain Voltage



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

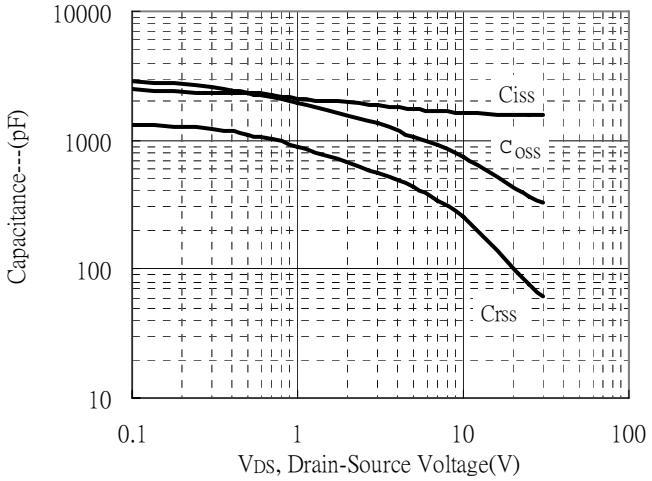


Drain-Source On-State Resistance vs Junction Tempearture

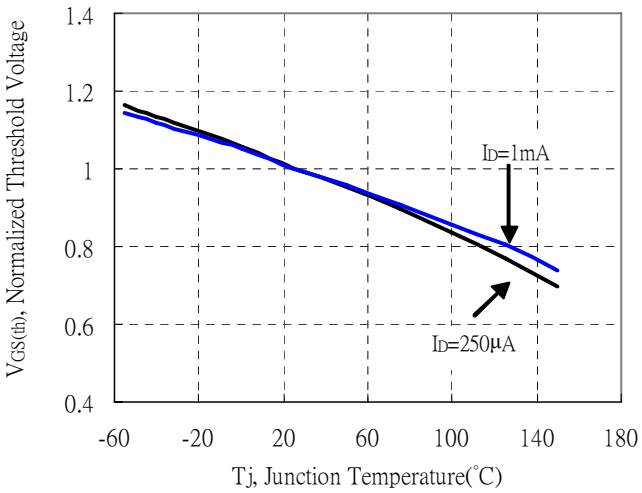


Typical Characteristics(Cont.)

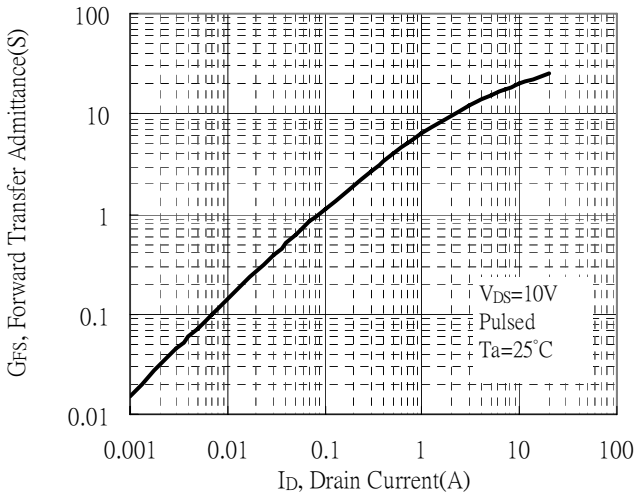
Capacitance vs Drain-to-Source Voltage



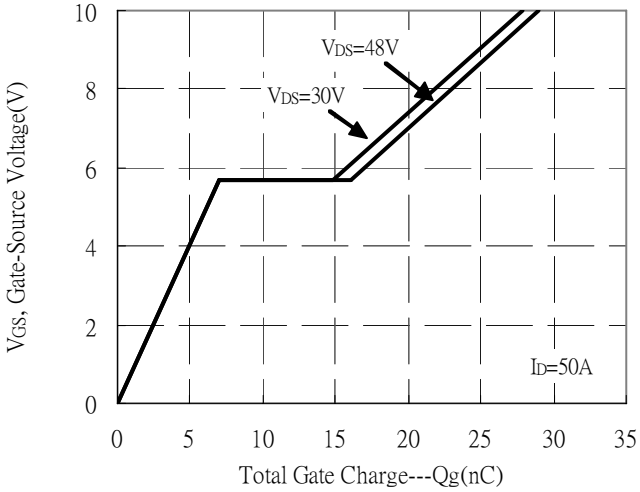
Threshold Voltage vs Junction Tempearture



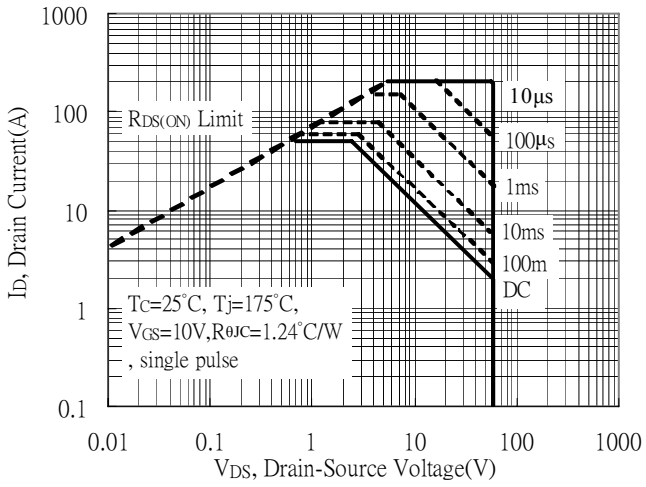
Forward Transfer Admittance vs Drain Current



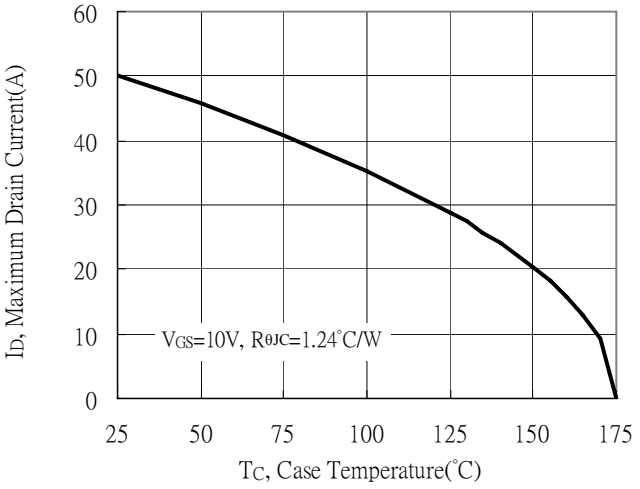
Gate Charge Characteristics



Maximum Safe Operating Area

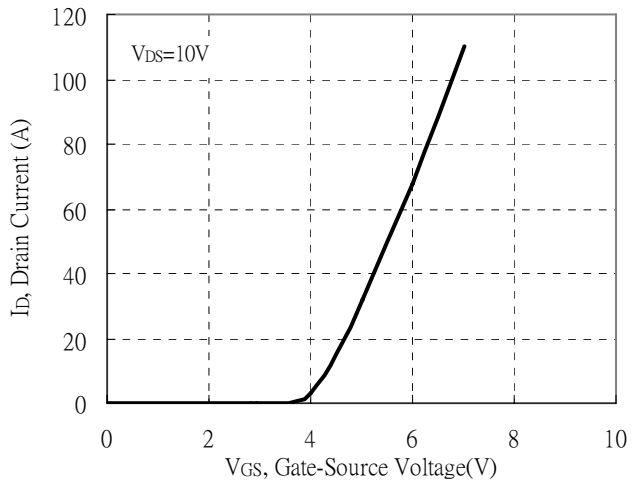


Maximum Drain Current vs Case Temperature

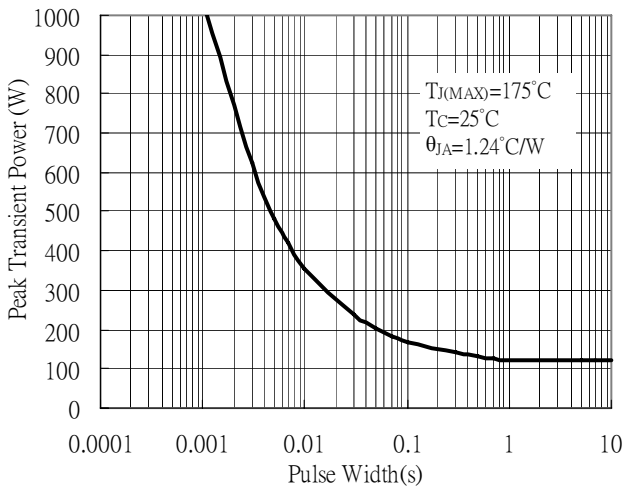


Typical Characteristics(Cont.)

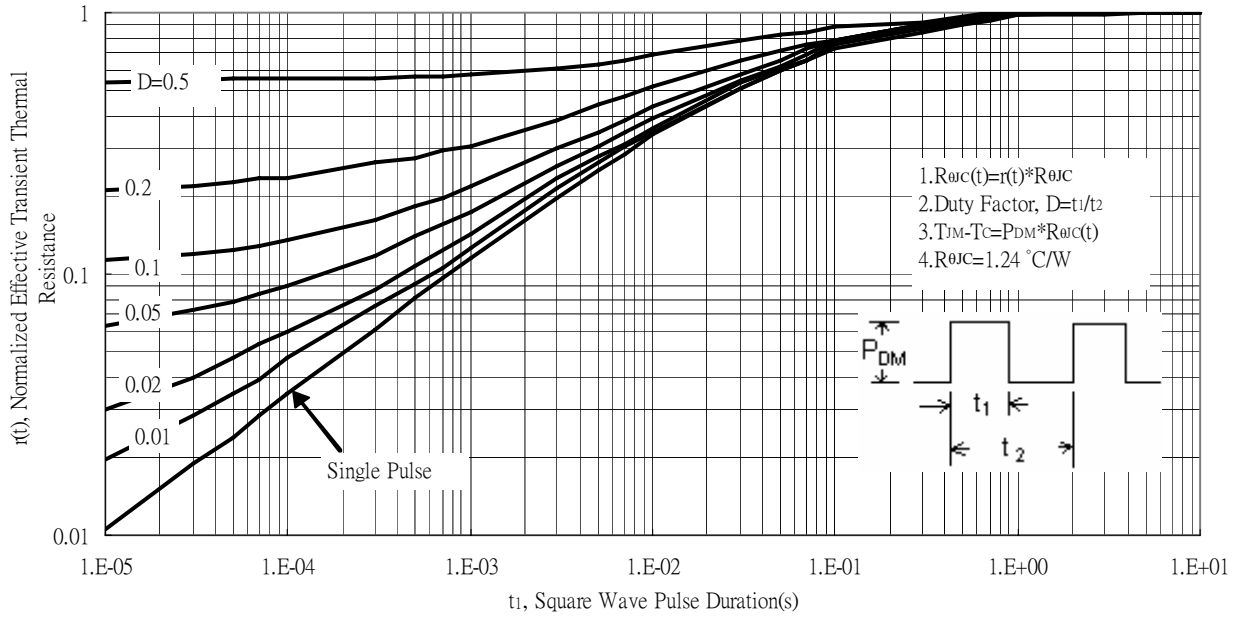
Typical Transfer Characteristics



Single Pulse Maximum Power Dissipation



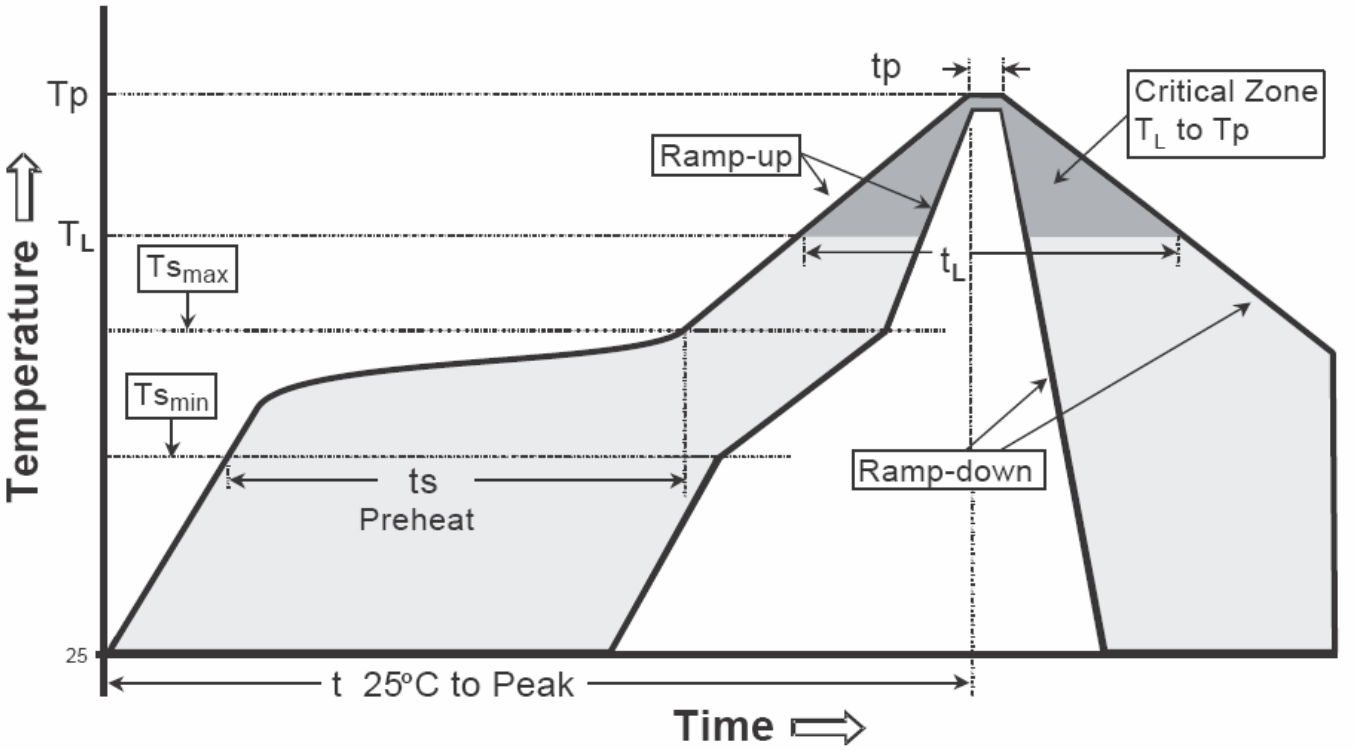
Transient Thermal Response Curves



Recommended wave soldering condition

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

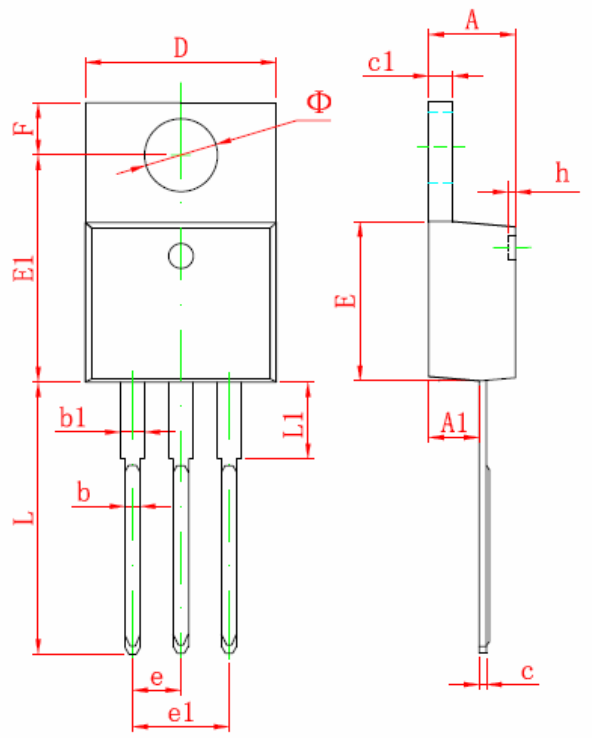
Recommended temperature profile for IR reflow



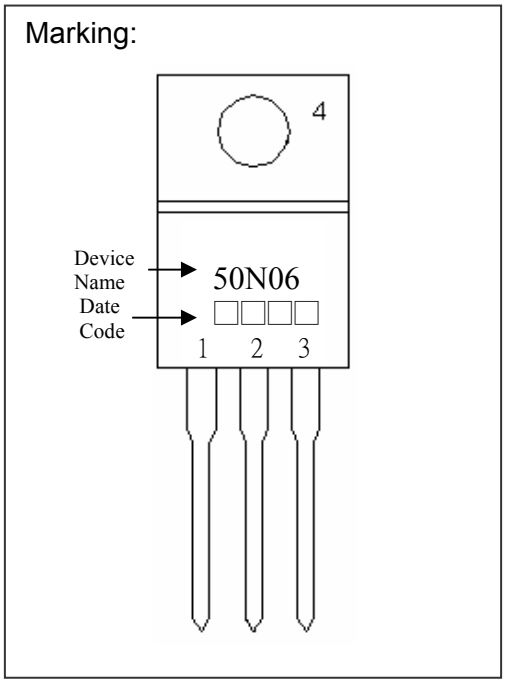
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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-220 Dimension



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.