N-Channel Enhancement Mode Power MOSFET

MTE3D0N10RE3

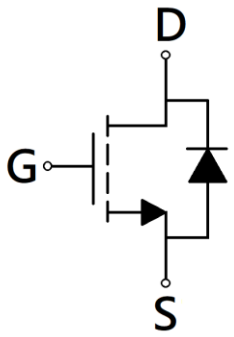
Features

- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic

BV_{DSS}	100V
I_D@V_{GS}=10V, T_C=25°C	130A
I_D@V_{GS}=10V, T_A=25°C	22A
$R_{DS(ON)}$@V_{GS}=10V, I_D=20A	3.2mΩ

Equivalent Circuit

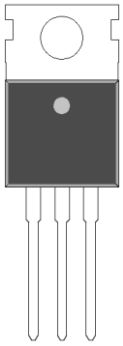
MTE3D0N10RE3



G : Gate S : Source D : Drain

Outline

TO-220



G D S

Ordering Information

Device	Package	Shipping
MTE3D0N10RE3-0-UB-G	TO-220 (Pb-free lead plating package)	50 pcs/tube, 20 tubes/box, 5 boxes / carton

Environment friendly grade : G for RoHS compliant and green compound products

Packing spec, UB : 50 pcs / tube, 20 tubes/box

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C	*a	I_D	130	A
Continuous Drain Current @ V_{GS}=10V, T_C=100°C	*a		84	
Continuous Drain Current @ V_{GS}=10V, T_A=25°C	*b		22	
Continuous Drain Current @ V_{GS}=10V, T_A=70°C	*b		18	
Pulsed Drain Current	*c	I_{DM}	520	
Continuous Body Diode Forward Current @ T_C=25°C	*a	I_S	104	
Avalanche Current @ L=0.1mH		I_{AS}	40	
Avalanche Energy @ L=0.5mH		E_{AS}	100	mJ
Total Power Dissipation	T_C=25°C *a	P_D	125	W
	T_C=100°C *a		50	
	T_A=25°C *b		3.6	
	T_A=70°C *b		2.3	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	°C

Thermal Data

Parameter		Symbol	Steady State	Unit
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	1	°C/W
Thermal Resistance, Junction-to-ambient	*b	$R_{\theta JA}$	34	

Note:

*a. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

*b. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_D is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

*c. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

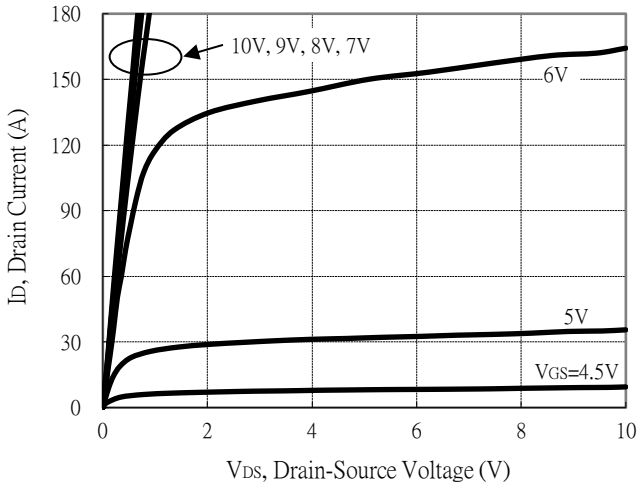
Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	100	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	2	-	4		V_{DS}=V_{GS}, I_D=250μA
G_{FS}	-	37.7	-	S	V_{DS}=10V, I_D=20A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=80V, V_{GS}=0V
$R_{DS(ON)}$	-	3.2	4	mΩ	V_{GS}=10V, I_D=20A
Dynamic					
Ciss	-	6200	-	pF	V_{DS}=50V, V_{GS}=0V, f=1MHz
Coss	-	860	-		
Crss	-	40	-		
Rg	-	0.9	-	Ω	f=1MHz
Qg *1, 2	-	90	-	nC	V_{DS}=50V, I_D=20A, V_{GS}=10V
Qgs *1, 2	-	30	-		
Qgd *1, 2	-	20	-		
$t_{d(ON)}$ *1, 2	-	42	-	ns	V_{DS}=50V, I_D=20A, V_{GS}=10V, R_{GS}=1.6Ω
tr *1, 2	-	25	-		
$t_{d(OFF)}$ *1, 2	-	70	-		
t_f *1, 2	-	20	-		
Source-Drain Diode					
V_{SD} *1	-	0.82	1.2	V	I_S=20A, V_{GS}=0V
trr	-	63	-	ns	I_F=20A, dI_F/dt=100A/μs
Qrr	-	135	-	nC	

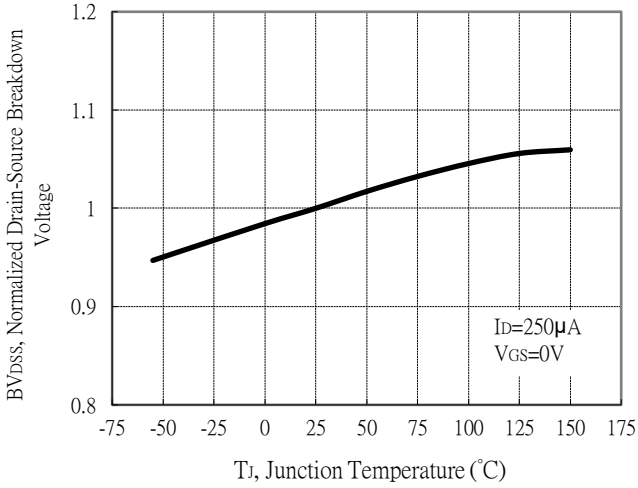
Note:
*1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2. Independent of operating temperature

Typical Characteristics

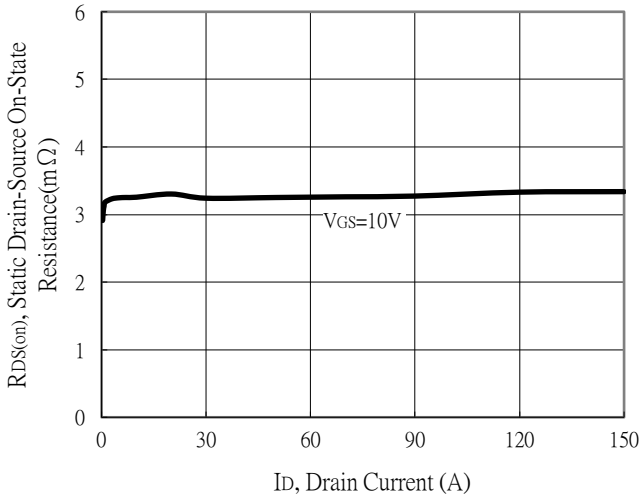
Typical Output Characteristics



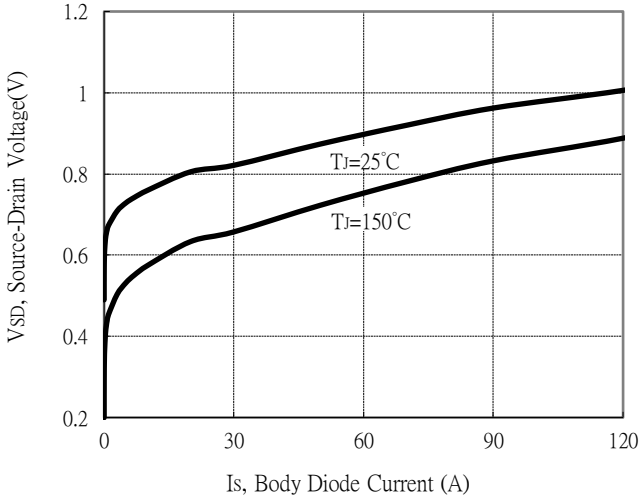
Breakdown Voltage vs Ambient Temperature



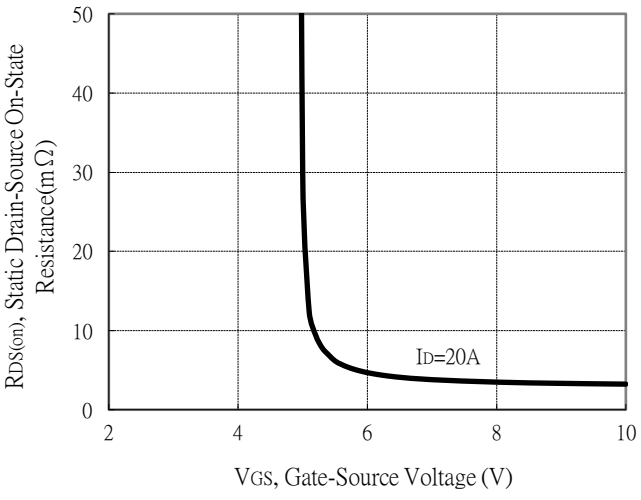
Static Drain-Source On-State resistance vs Drain Current



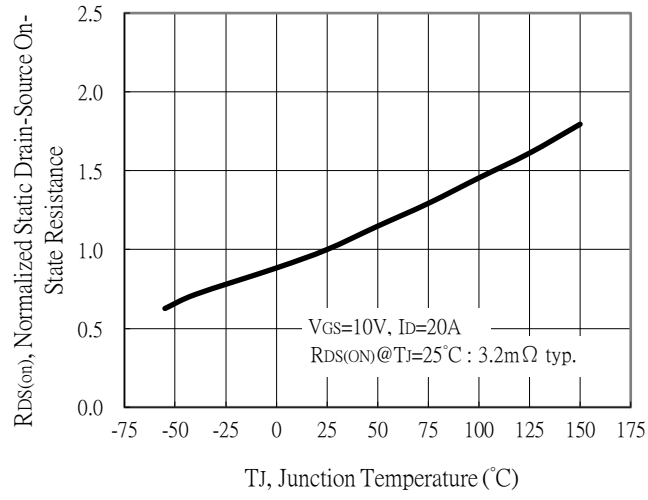
Body Diode Current vs Source-Drain Voltage



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

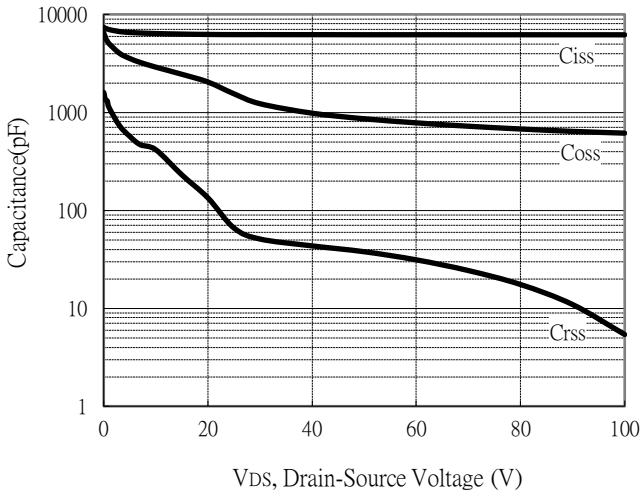


Drain-Source On-State Resistance vs Junction Temperature

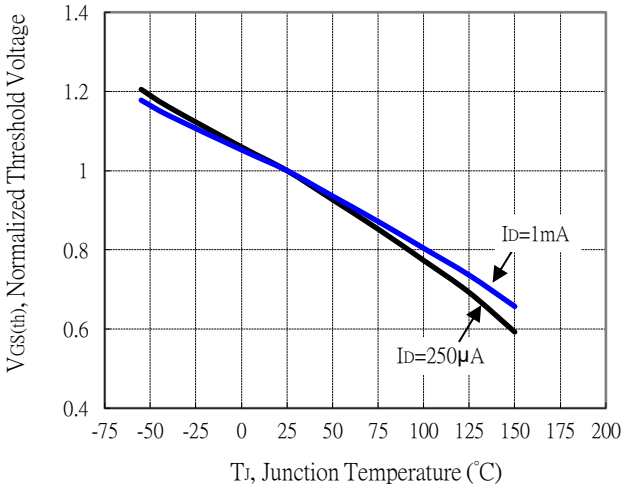


Typical Characteristics(Cont.)

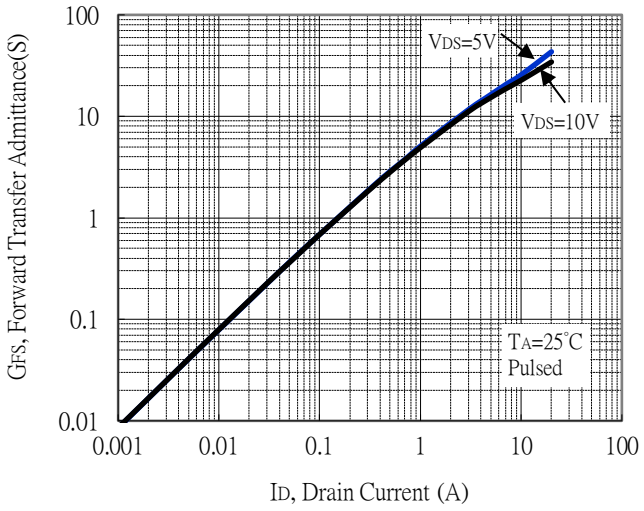
Capacitance vs Drain-to-Source Voltage



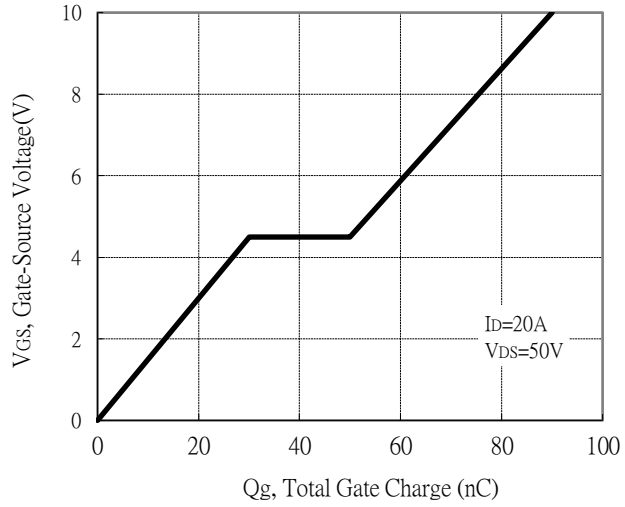
Threshold Voltage vs Junction Temperature



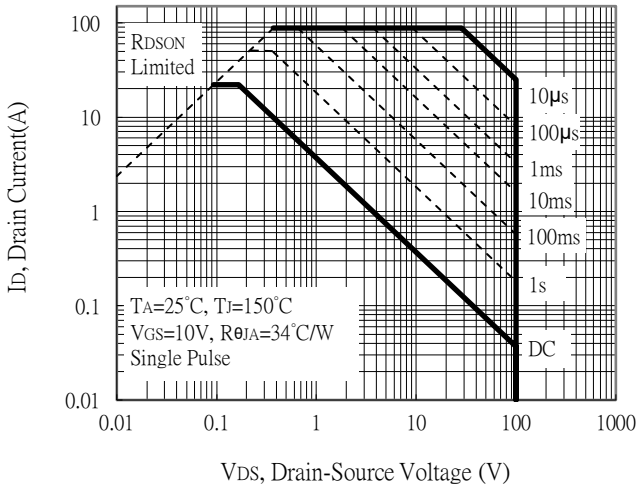
Forward Transfer Admittance vs Drain Current



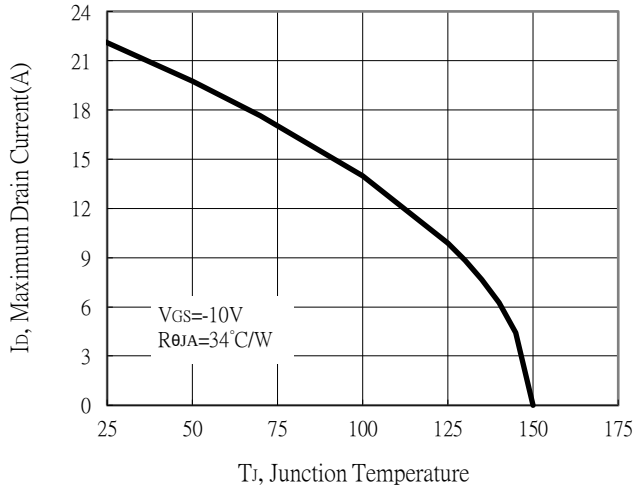
Gate Charge Characteristics



Maximum Safe Operating Area

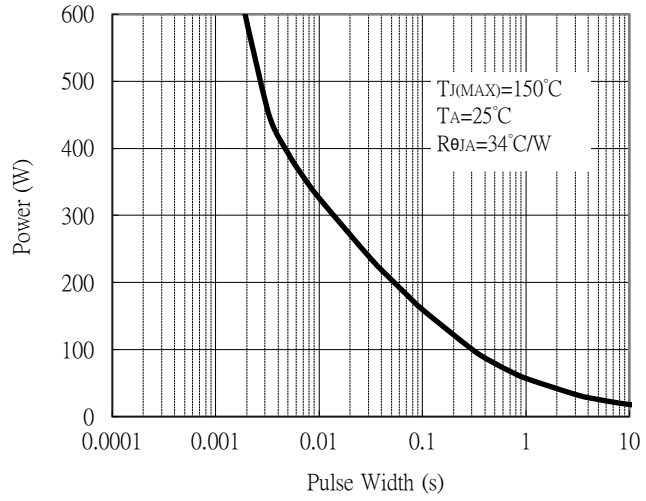


Maximum Drain Current vs Case Temperature

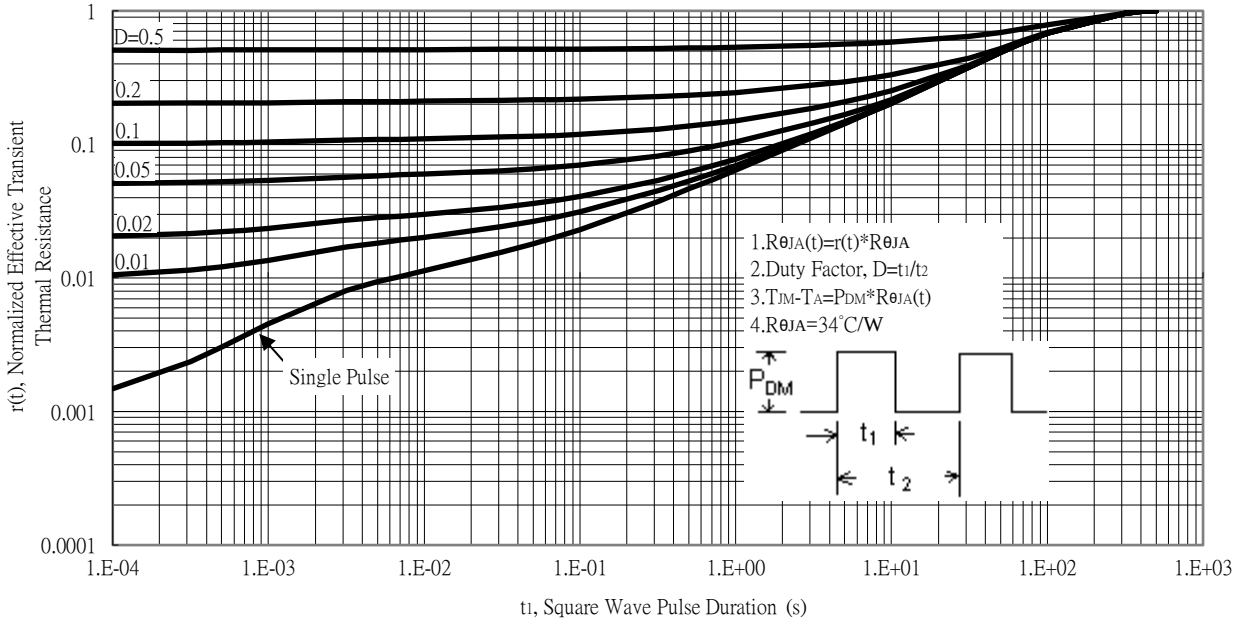


Typical Characteristics(Cont.)

Single Pulse Power Rating, Junction to Ambient



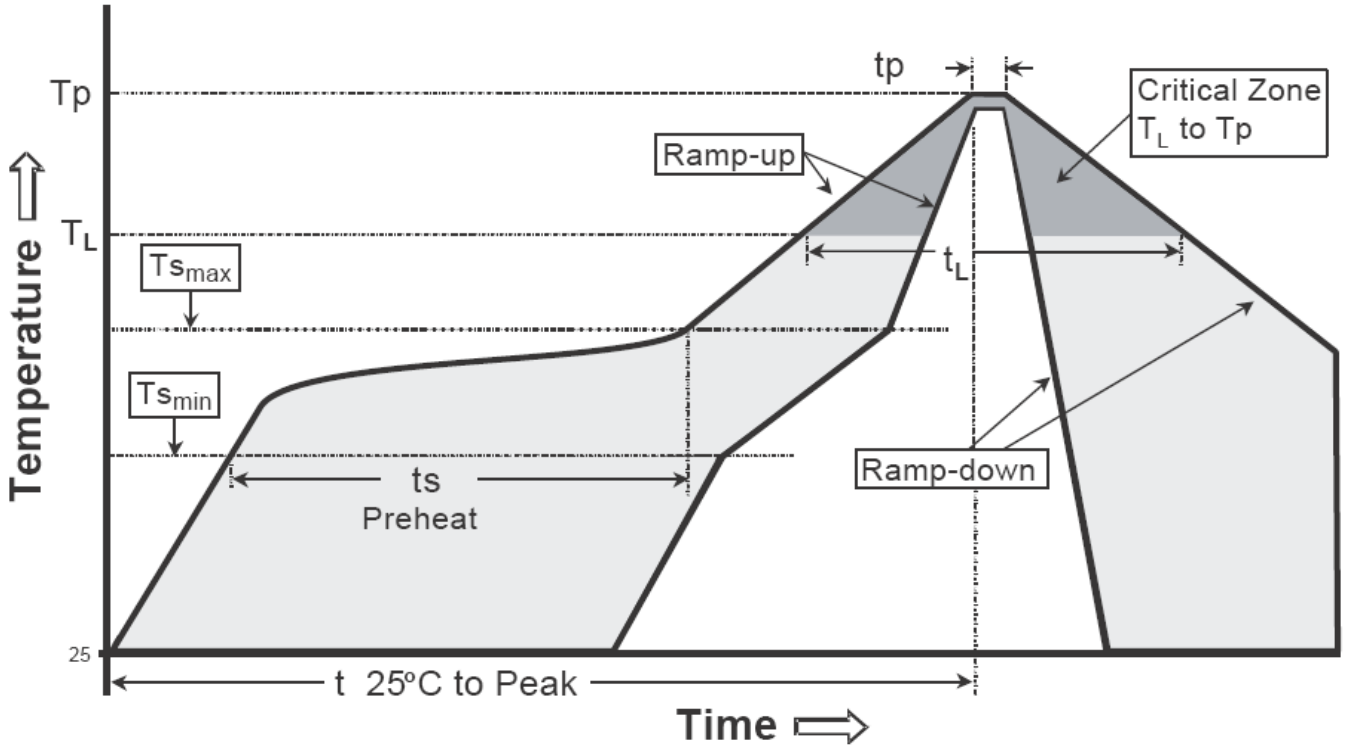
Transient Thermal Response Curves



Recommended wave soldering condition

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

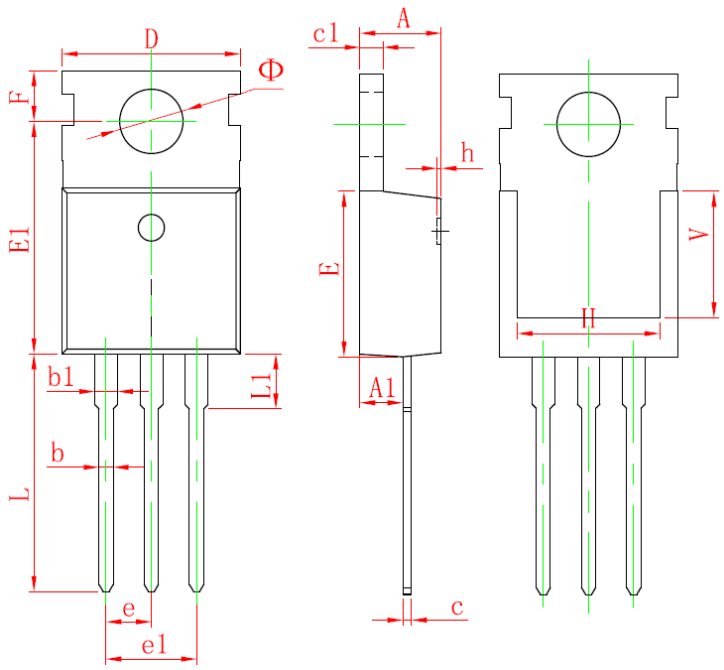
Recommended temperature profile for IR reflow



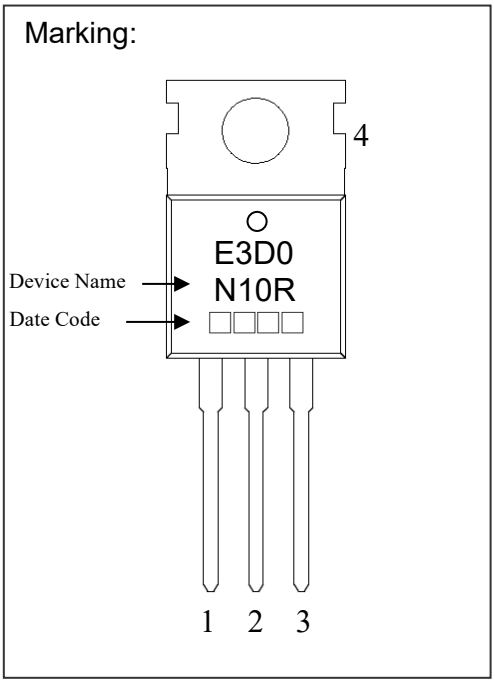
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − 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-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	4.400	4.600	0.173	0.181	e	2.540*		0.100*	
A1	2.250	2.550	0.089	0.100	e1	4.980	5.180	0.196	0.204
b	0.710	0.910	0.028	0.036	F	2.650	2.950	0.104	0.116
b1	1.170	1.370	0.046	0.054	H	7.900	8.100	0.311	0.319
c	0.330	0.650	0.013	0.026	h	0.000	0.300	0.000	0.012
c1	1.200	1.400	0.047	0.055	L	12.900	13.400	0.508	0.528
D	9.910	10.250	0.390	0.404	L1	2.850	3.250	0.112	0.128
E	8.950	9.750	0.352	0.384	V	6.900	REF	0.271	REF
E1	12.650	13.050	0.498	0.514	Φ	3.400	3.800	0.134	0.150

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.