N-Channel Enhancement Mode Power MOSFET

MTE2D4N06FP

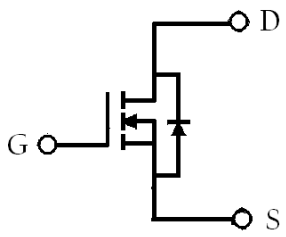
BV_{DSS}	60V
I_D @ V_{GS}=10V, T_C=25°C	60A
$R_{DSON(TYP)}$ @ V_{GS}=10V, I_D=20A	3.2mΩ
$R_{DSON(TYP)}$ @ V_{GS}=7V, I_D=20A	3.4mΩ

Features

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

Symbol

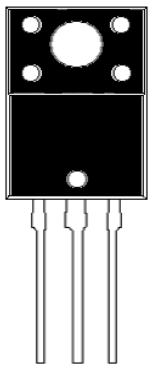
MTE2D4N06FP



G：Gate
D：Drain
S：Source

Outline

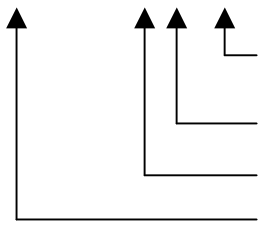
TO-220FP



G D S

Ordering Information

Device	Package	Shipping
MTE2D4N06FP-0-UB-S	TO-220FP (Pb-free lead plating package)	50 pcs/tube, 20 tubes/box, 4 boxes / carton



Environment friendly grade : S for RoHS compliant products, 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_C=25°C, unless otherwise noted)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±30	
Continuous Drain Current @ T_C=25°C, V_{GS}=10V (package limit)		I_D	60	A
Continuous Drain Current @ T_C=25°C, V_{GS}=10V (silicon limit)			105	
Continuous Drain Current @ T_C=100°C, V_{GS}=10V (silicon limit)			74.3	
Pulsed Drain Current	(Note 4)	I_{DM}	420	
Continuous Drain Current @ T_A=25°C	(Note 2)	I_{DSM}	15	
Continuous Drain Current @ T_A=70°C	(Note 2)		12	
Avalanche Current	(Note 5)	I_{AS}	10	
Avalanche Energy @ L=1mH, I_D=10A, V_{DD}=25V	(Note 5)	E_{AS}	50 *	mJ
Repetitive Avalanche Energy@ L=0.1mH	(Note 3)	E_{AR}	11	
Power Dissipation	T_C=25°C (Note 1)	P_D	107	W
	T_C=100°C (Note 1)		53.5	
Power Dissipation	T_A=25°C (Note 2)	P_{DSM}	2	
	T_A=70°C (Note 2)		1.3	
Operating Junction and Storage Temperature		Tj, Tstg	-55~+175	°C

* 100% UIS testing in condition of V_{DD}=25V, L=1mH, V_G=10V, I_L=6A, Rated V_{DS}=60V

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, t≤10s	(Note 1)	$R_{th,j-a}$	15	
Thermal Resistance, Junction-to-ambient, max	(Note 1)		62.5	

Note : 1. The power dissipation P_D is based on $T_{J(MAX)}$=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

2. 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_{DSM} 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, and the maximum temperature of 175°C may be used if the PCB allows it.

3. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=175°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

4. Pulse width ≤300μs pulses and duty cycle ≤0.5%.

5. Pulse width limited by junction temperature.

6. The $R_{\theta JA}$ is the sum of thermal resistance from junction to case $R_{\theta JC}$ and case to ambient.

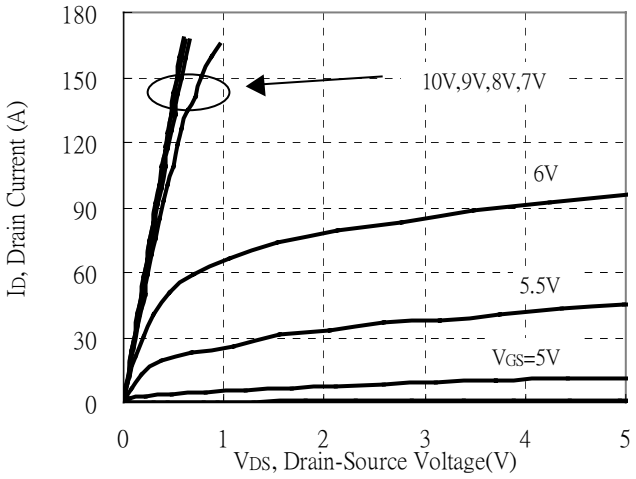
Characteristics (T_C=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	60	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	2.0	-	4.0		V_{DS} = V_{GS}, I_D=250μA
G_{FS}	-	66	-	S	V_{DS} =5V, I_D=20A
I_{GSS}	-	-	±100	nA	V_{GS}=±30V
I_{DSS}	-	-	100		V_{DS} =48V, V_{GS} =0V
	-	-	10	μA	V_{DS} =48V, V_{GS} =0V, Tj=55°C
*$R_{DS(ON)}$	-	3.2	4.2	mΩ	V_{GS} =10V, I_D=20A
	-	3.4	4.5		V_{GS} =7V, I_D=20A
Dynamic					
*Qg	-	141.5	-	nC	I_D=60A, V_{DS}=30V, V_{GS}=10V
*Qgs	-	14.6	-		
*Qgd	-	55.0	-		
*$t_{d(ON)}$	-	42.4	-	ns	V_{DS}=30V, I_D=60A, V_{GS}=10V, R_G=4.7Ω
*tr	-	67.8	-		
*$t_{d(OFF)}$	-	108	-		
*t_f	-	61.8	-		
Ciss	-	5663	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Coss	-	970	-		
Crss	-	359	-		
Rg	-	1.7	-	Ω	f=1MHz
Source-Drain Diode					
*I_S	-	-	60	A	
*V_{SD}	-	0.65	1	V	I_S=1A, V_{GS}=0V
*trr	-	33	-	ns	I_F=60A, V_{GS}=0, dI_F/dt=100A/μs
*Qrr	-	25	-	nC	

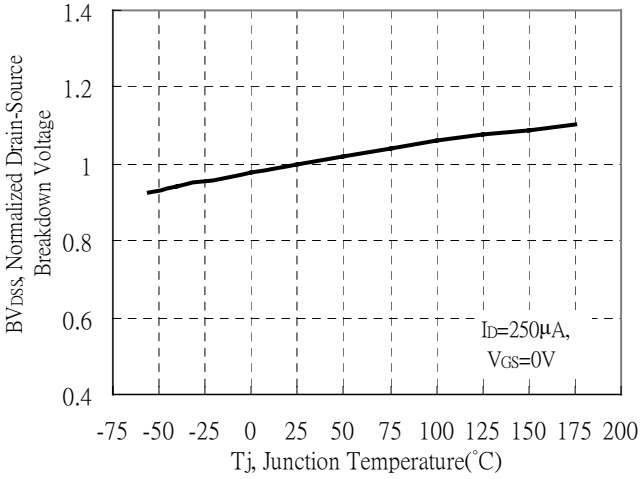
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics

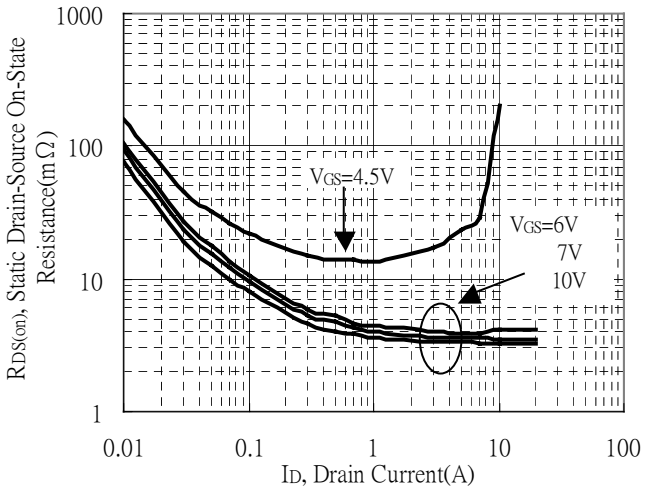
Typical Output Characteristics



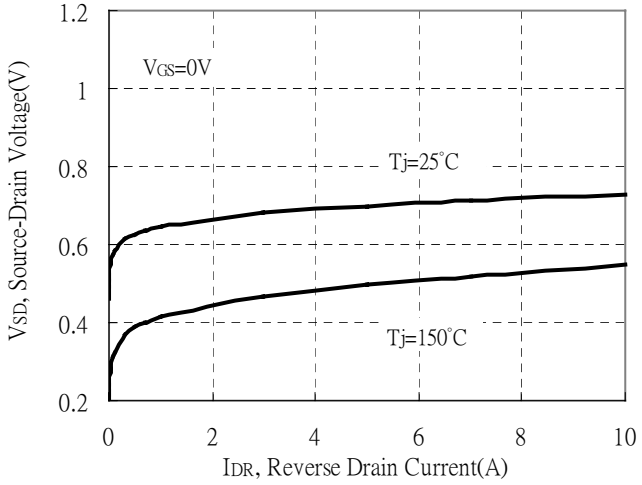
Brekdown Voltage vs Ambient Temperature



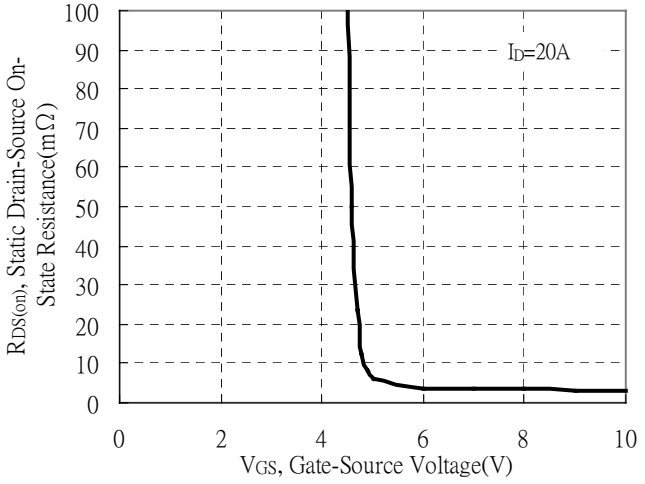
Static Drain-Source On-State resistance vs Drain Current



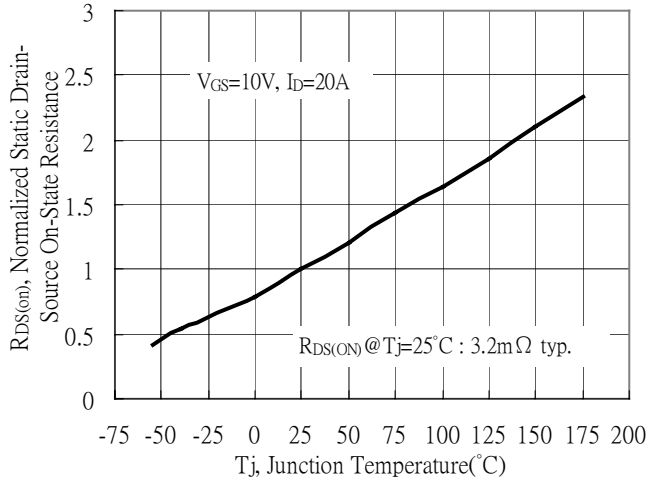
Reverse Drain Current vs Source-Drain Voltage



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

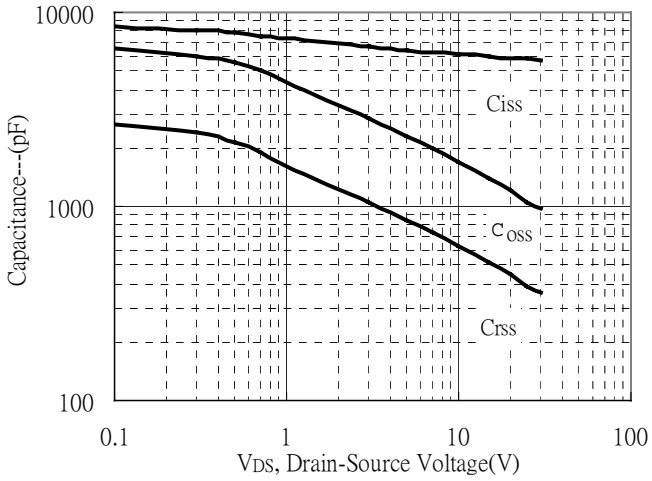


Drain-Source On-State Resistance vs Junction Tempearture

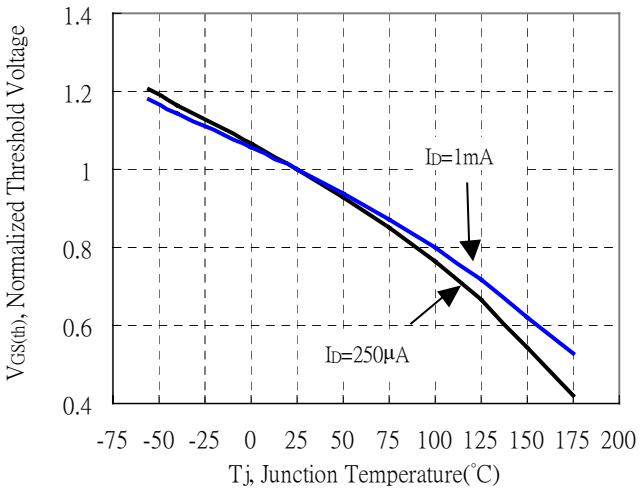


Typical Characteristics(Cont.)

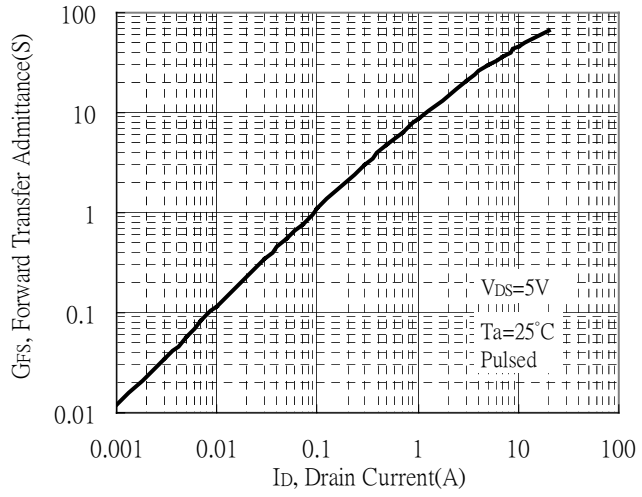
Capacitance vs Drain-to-Source Voltage



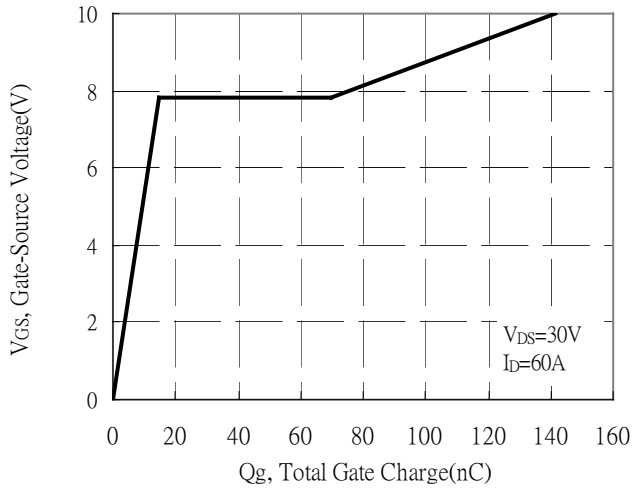
Threshold Voltage vs Junction Tempearture



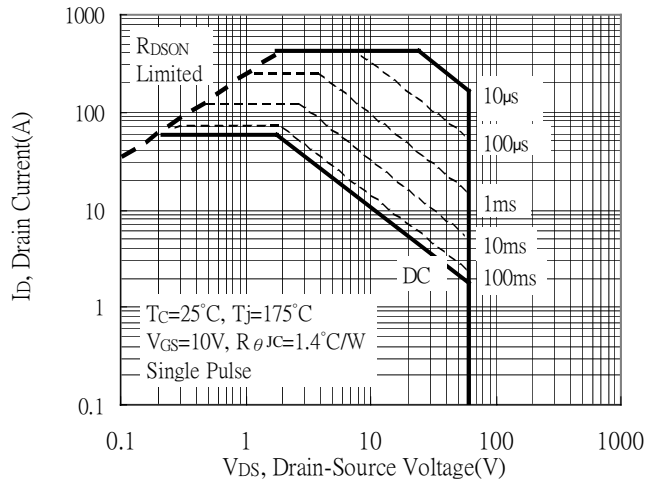
Forward Transfer Admittance vs Drain Current



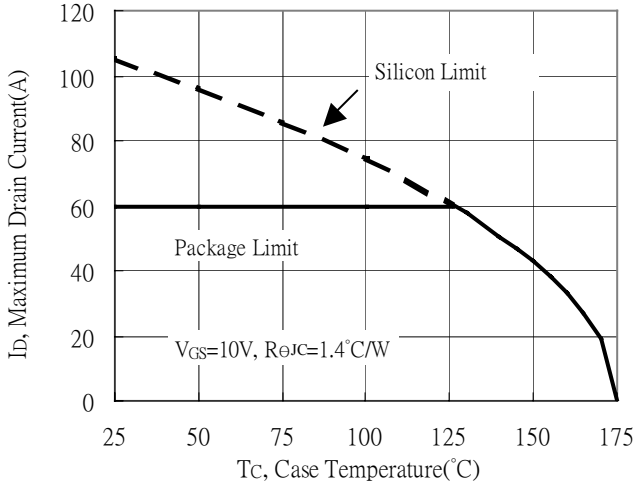
Gate Charge Characteristics



Maximum Safe Operating Area

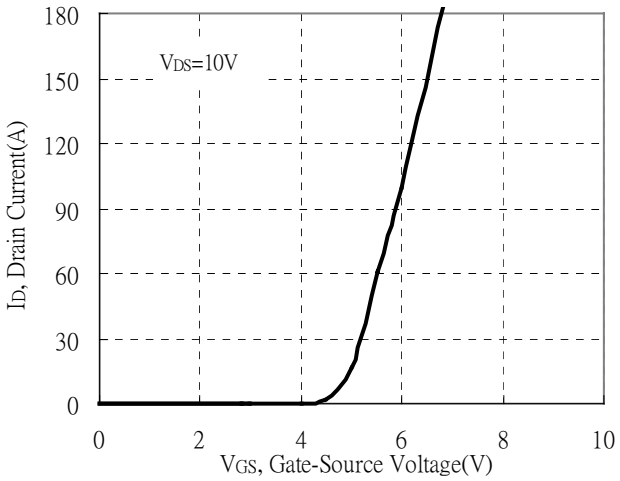


Maximum Drain Current vs Case Temperature

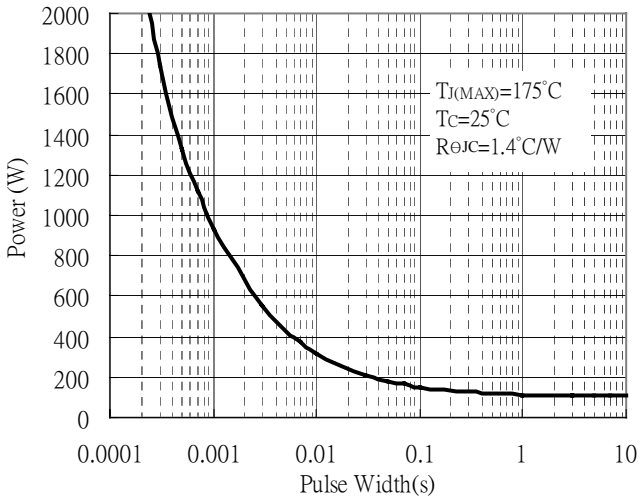


Typical Characteristics(Cont.)

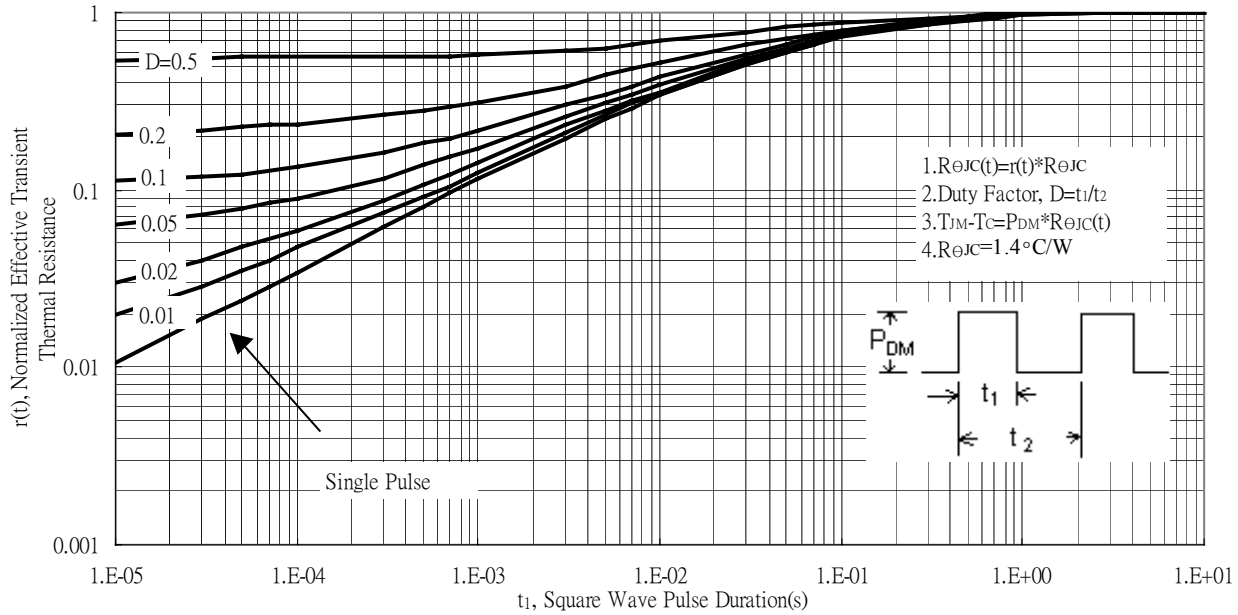
Typical Transfer Characteristics



Single Pulse Power Rating, Junction to Case



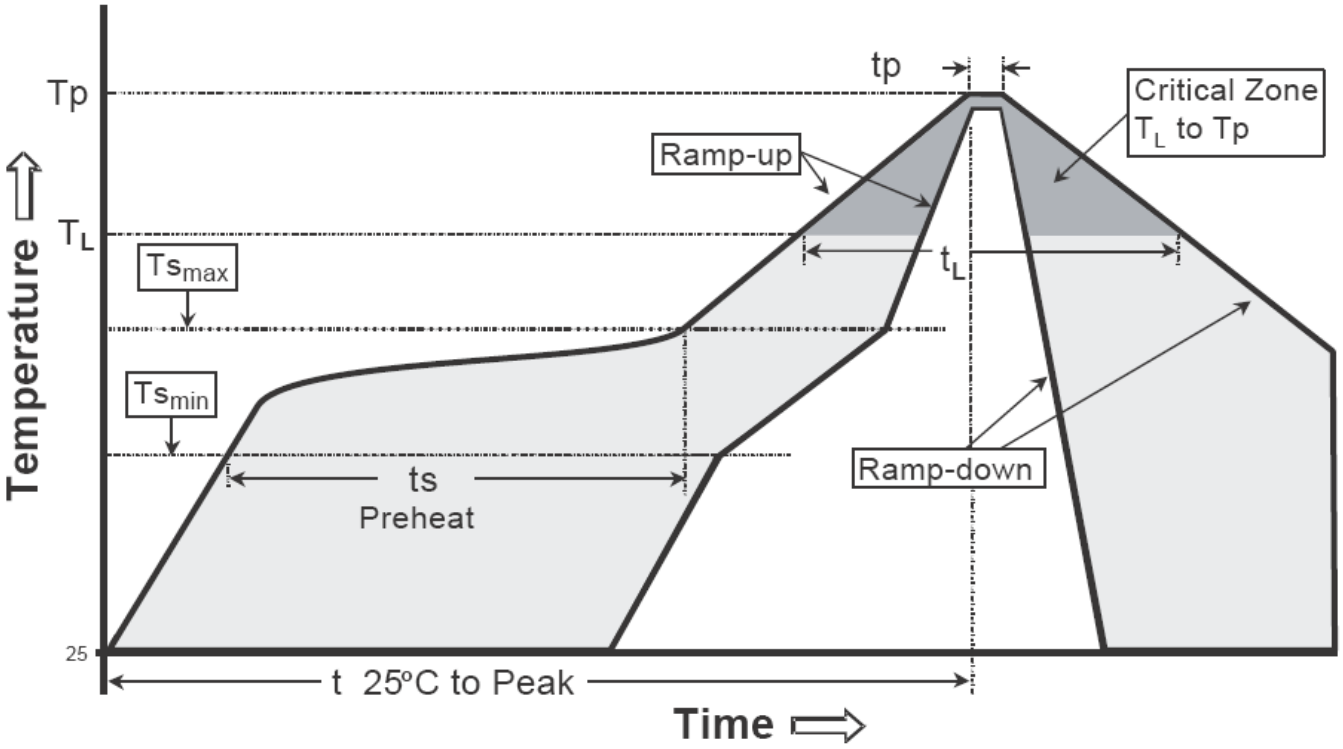
Transient Thermal Response Curves



Recommended wave soldering condition

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

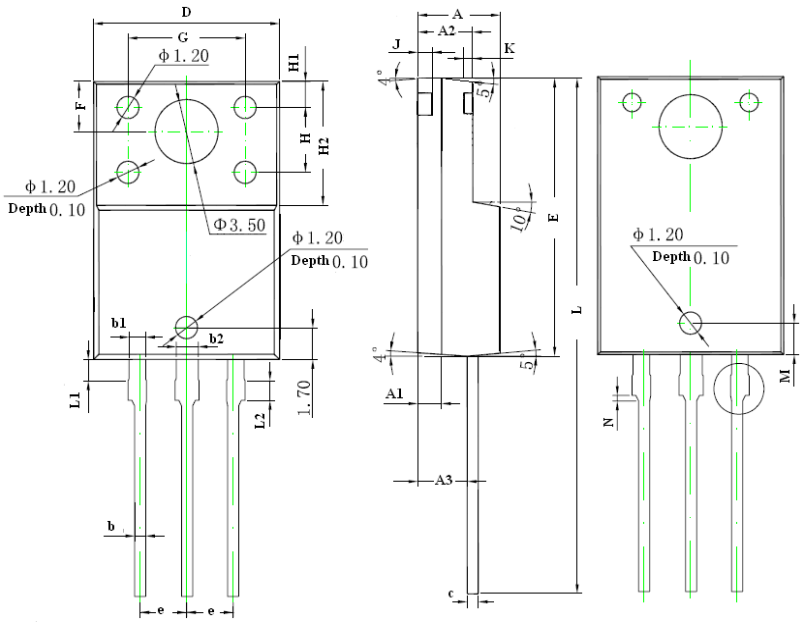
Recommended temperature profile for IR reflow



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.

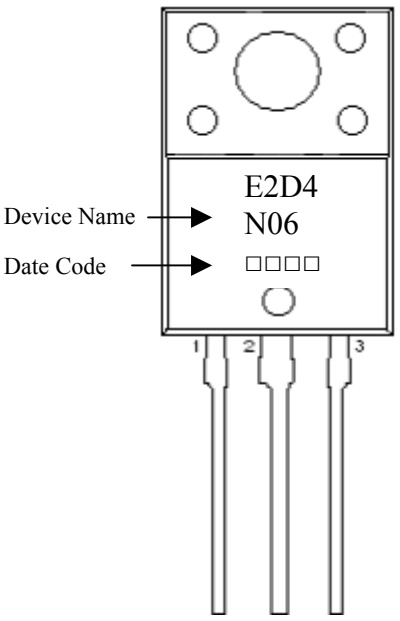
Note : All temperatures refer to topside of the package, measured on the package body surface.

TO-220FP Dimension



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

Marking:



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

*Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.171	0.183	4.35	4.65	G	0.246	0.258	6.25	6.55
A1	0.051 REF		1.300 REF		H	0.138 REF		3.50 REF	
A2	0.112	0.124	2.85	3.15	H1	0.055 REF		1.40 REF	
A3	0.102	0.110	2.60	2.80	H2	0.256	0.272	6.50	6.90
b	0.020	0.030	0.50	0.75	J	0.031 REF		0.80 REF	
b1	0.031	0.041	0.80	1.05	K	0.020		0.50 REF	
b2	0.047 REF		1.20 REF		L	1.102	1.118	28.00	28.40
c	0.020	0.030	0.500	0.750	L1	0.043	0.051	1.10	1.30
D	0.396	0.404	10.06	10.26	L2	0.036	0.043	0.92	1.08
E	0.583	0.598	14.80	15.20	M	0.067 REF		1.70 REF	
e	0.100 *		2.54*		N	0.012 REF		0.30 REF	
F	0.106 REF		2.70 REF						

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.