P-Channel Enhancement Mode Power MOSFET

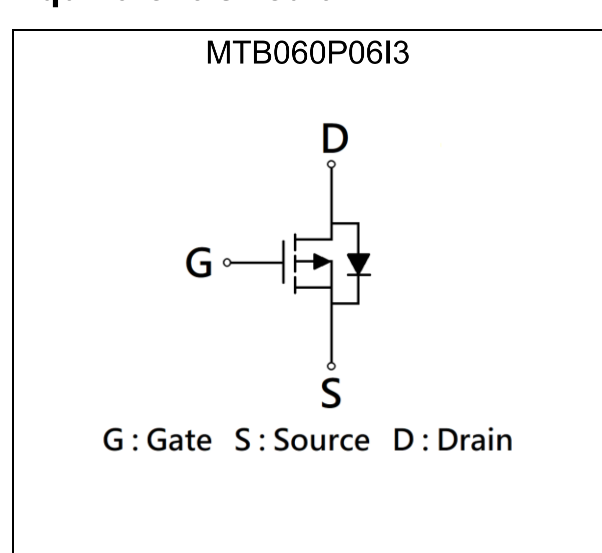
MTB060P06I3

Features

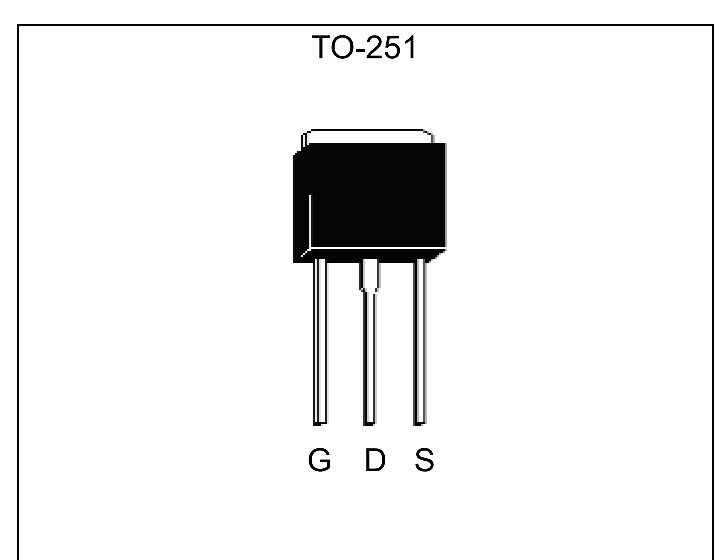
- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic

BV_{DSS}	-60V
I_D@V_{GS}=-10V, T_C=25°C	-14A
I_D@V_{GS}=-10V, T_A=25°C	-4.4A
$R_{DS(ON)}$ typ. @V_{GS}=-10V, I_D=-4A	66mΩ
$R_{DS(ON)}$ typ. @V_{GS}=-4.5V, I_D=-3A	80mΩ

Equivalent Circuit



Outline



Ordering Information

Device	Package	Shipping
MTB060P06I3-0-UA-G	TO-251 (Pb-free lead plating and halogen-free package)	80 pcs/tube, 50 tubes/box

- Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products
- Packing spec, UA: 80 pcs / tube, 50 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}	-60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ V_{GS}=-10V, T_C=25°C *a		I_D	-14	A
Continuous Drain Current @ V_{GS}=-10V, T_C=100°C *a			-8.8	
Continuous Drain Current @ V_{GS}=-10V, T_A=25°C *b			-4.4	
Continuous Drain Current @ V_{GS}=-10V, T_A=70°C *b			-3.5	
Pulsed Drain Current *c		I_{DM}	-56	
Continuous Body Diode Forward Current @ T_C=25°C *a		I_S	-14	
Pulsed Body Diode Forward Current @ T_C=25°C		I_{SM}	-56	
Avalanche Current @ L=0.1mH		I_{AS}	-14	
Avalanche Energy @ L=0.5mH		E_{AS}	6	mJ
Total Power Dissipation	T_C=25°C *a	P_D	34	W
	T_C=100°C *a		14	
	T_A=25°C *b		3.2	
	T_A=70°C *b		2	
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	$R_{\theta JC}$	3.7	°C/W
Thermal Resistance, Junction-to-ambient *b	$R_{\theta JA}$	39	

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}	-60	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-1	-	-2.5	V	V_{DS}=V_{GS}, I_D=-250μA
G_{FS}	-	8	-	S	V_{DS}=-10V, I_D=-4A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-48V, V_{GS}=0V
$R_{DS(ON)}$	-	66	86	mΩ	V_{GS}=-10V, I_D=-4A
	-	80	110	mΩ	V_{GS}=-4.5V, I_D=-3A
Dynamic					
Ciss	-	1400	-	pF	V_{DS}=-30V, V_{GS}=0V, f=1MHz
Coss	-	65	-	pF	
Crss	-	50	-	pF	
Rg	-	24	-	Ω	f=1MHz
Qg *1, 2	-	25	-	nC	V_{DS}=-30V, I_D=-4A, V_{GS}=-10V
Qgs *1, 2	-	3.7	-	nC	
Qgd *1, 2	-	4	-	nC	
$t_{d(ON)}$ *1, 2	-	7	-	ns	V_{DS}=-30V, I_D=-4A, V_{GS}=-10V, R_{GS}=6Ω
tr *1, 2	-	22	-	ns	
$t_{d(OFF)}$ *1, 2	-	120	-	ns	
t_f *1, 2	-	50	-	ns	
Source-Drain Diode					
V_{SD} *1	-	-0.83	-1.2	V	I_S=-4A, V_{GS}=0V
trr	-	12	-	ns	I_F=-4A, dI_F/dt=100A/μs
Qrr	-	8	-	nC	

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

Typical Characteristics

Typical Output Characteristics

-ID, Drain Current(A)

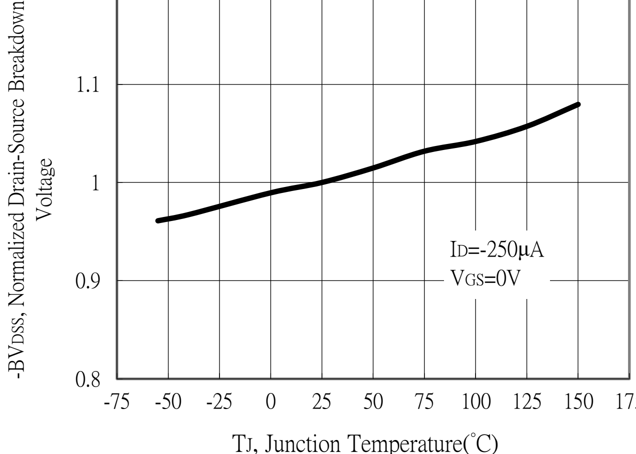
-VDS, Drain-Source Voltage(V)

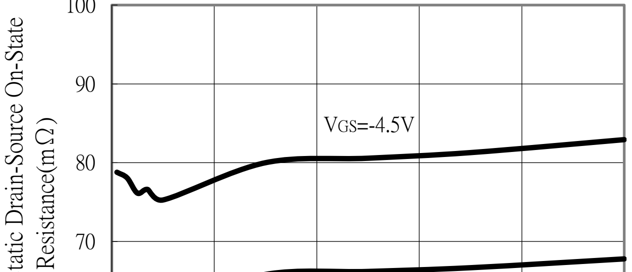
-4V

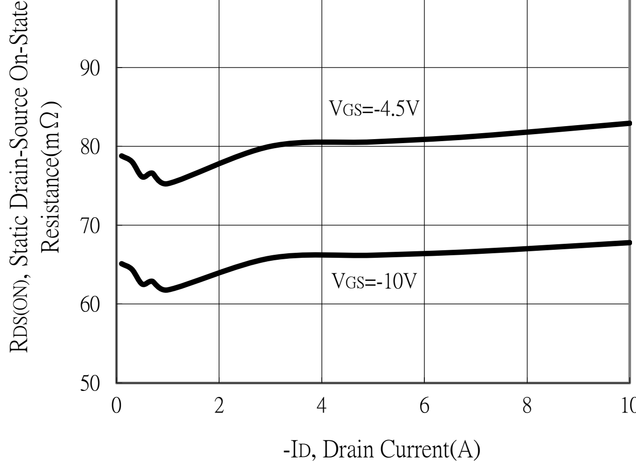
-10V,-9V,-8V,-7V,-6V,-5V

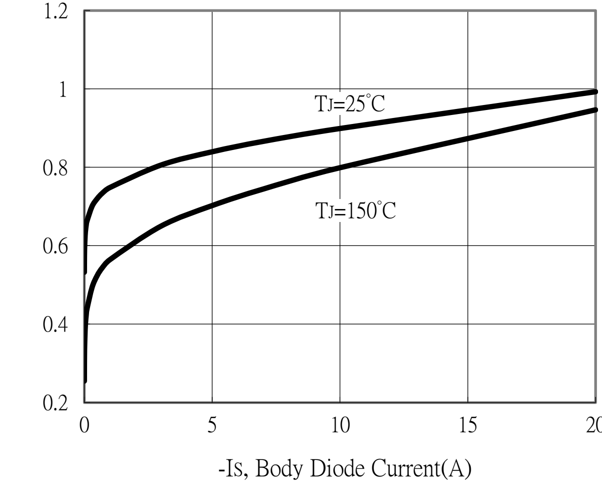
-3.5V

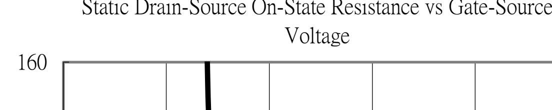
VGS=-3V

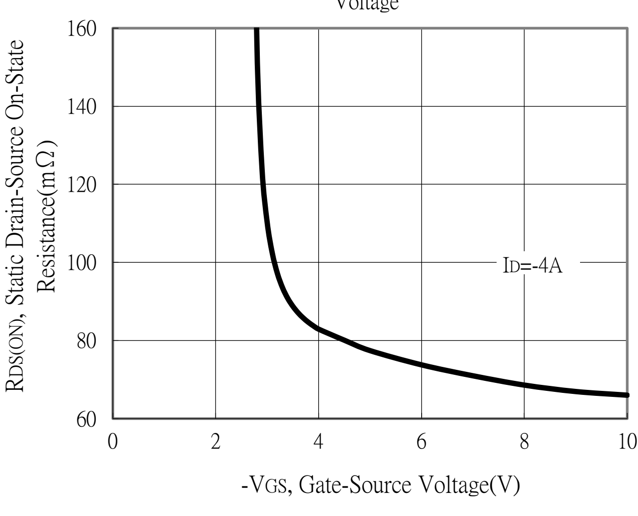


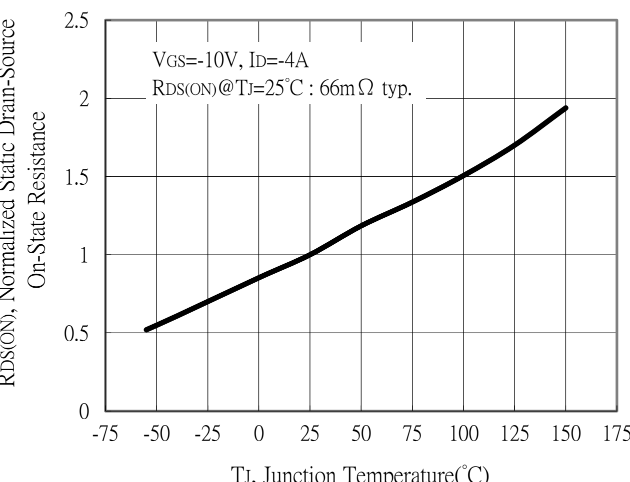








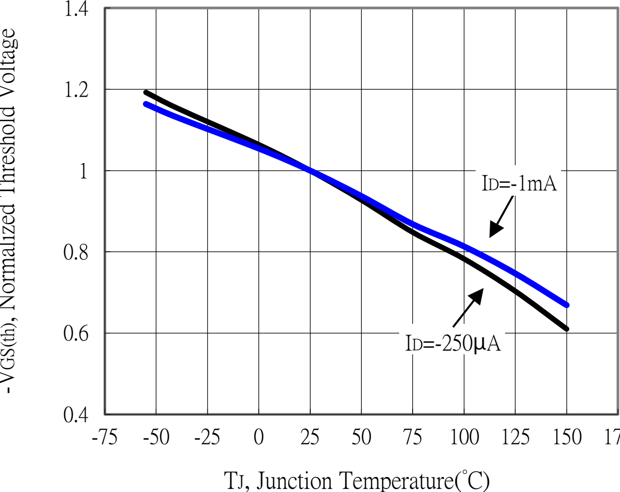




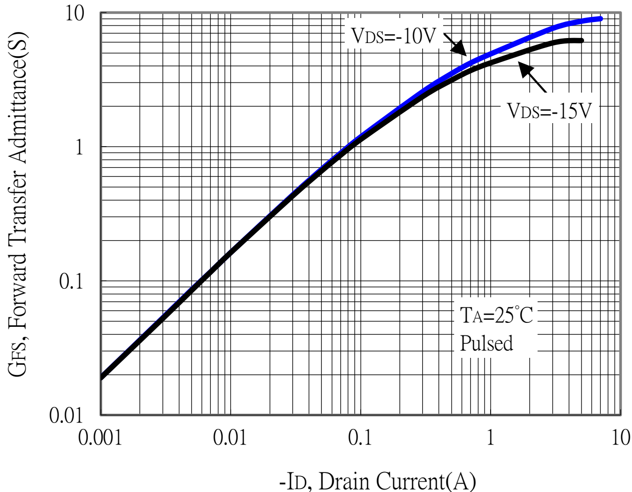
Typical Characteristics (Cont.)

Capacitance vs Drain-to-Source Voltage

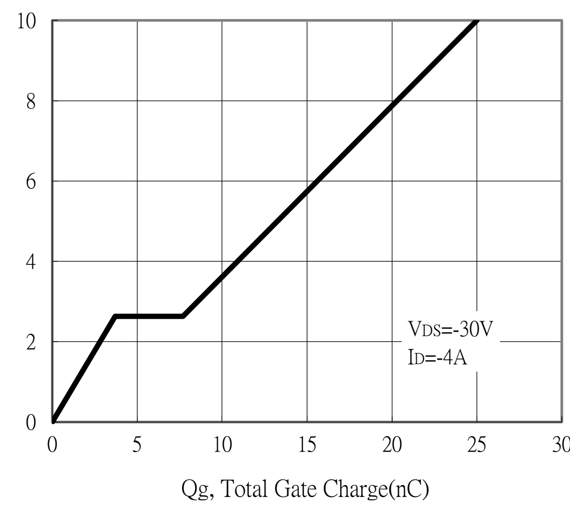
Threshold Voltage vs Junction Temperature



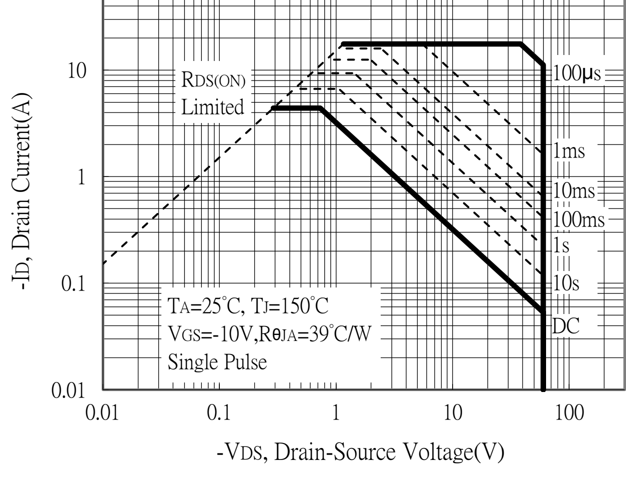
Forward Transfer Admittance vs Drain Current



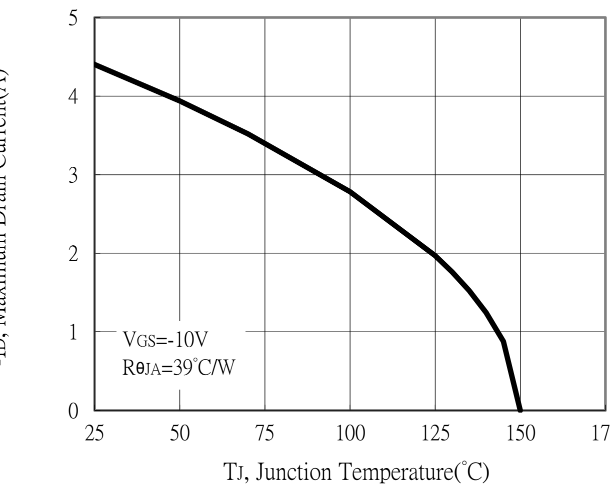
Gate Charge Characteristics



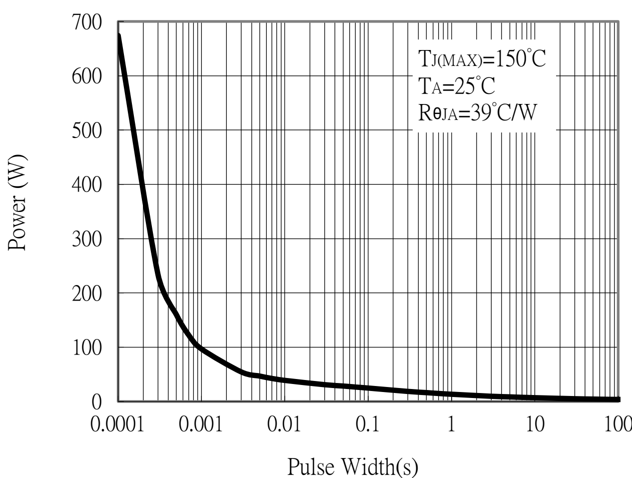
Maximum Safe Operating Area

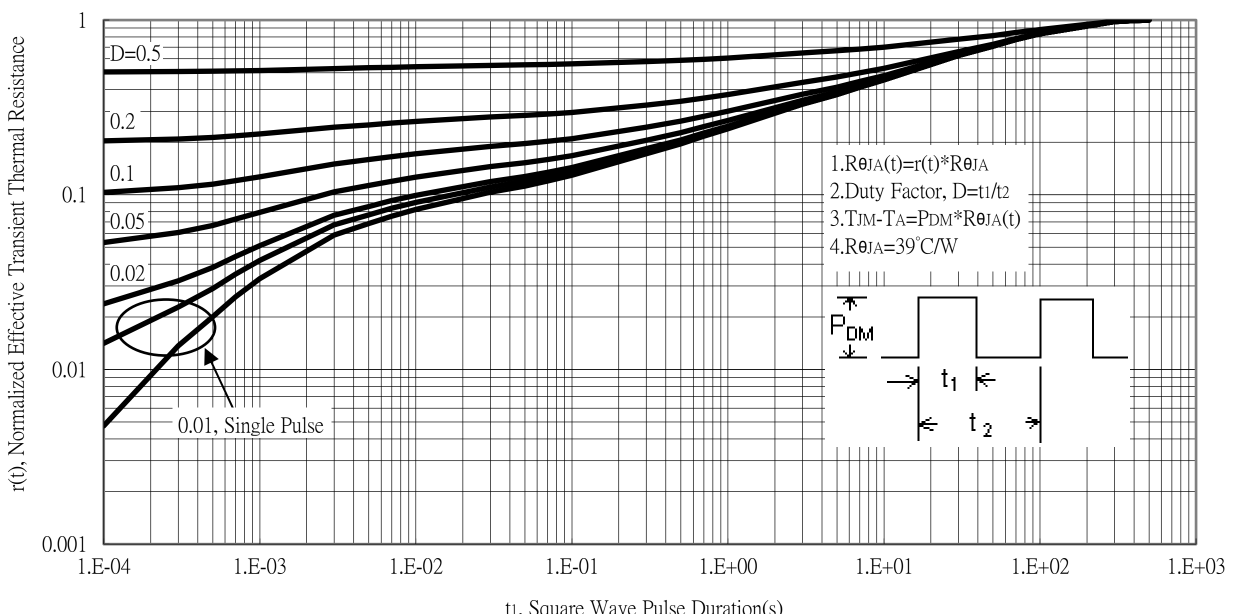


Maximum Drain Current vs Junction Temperature



Typical Characteristics (Cont.)

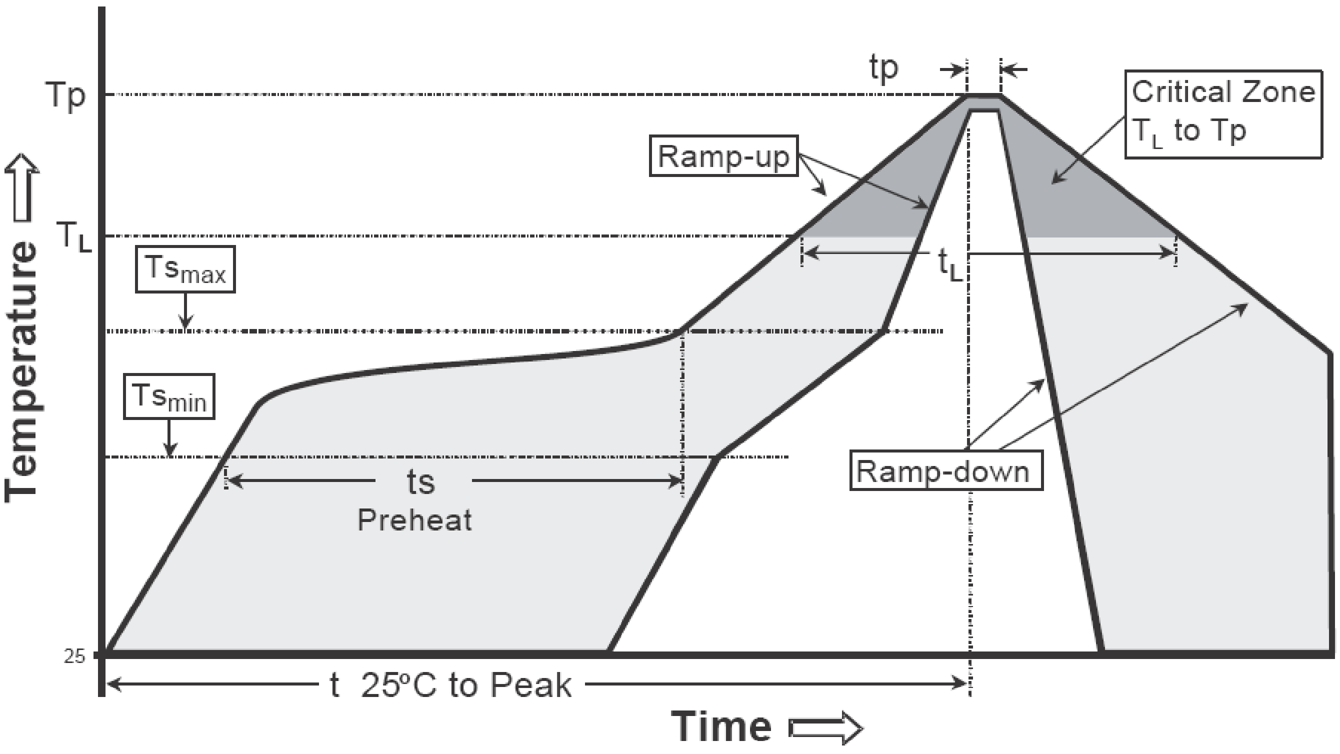




Recommended wave soldering condition

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

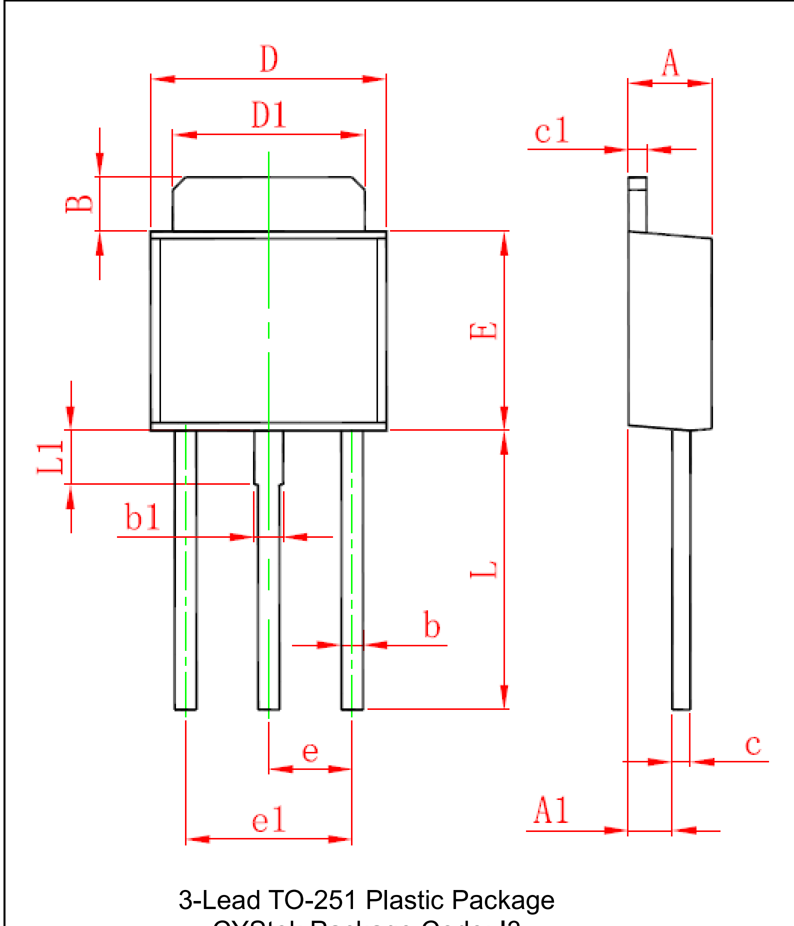
Recommended temperature profile for IR reflow



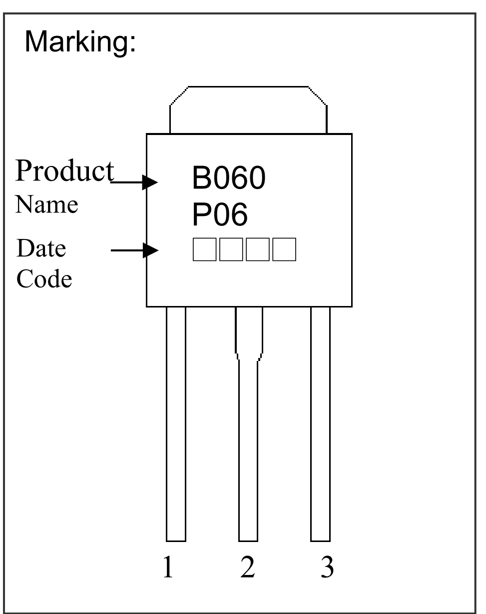
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time(ts_{min} to ts_{max})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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-251 Dimension



3-Lead TO-251 Plastic Package
CYStek Package Code: I3



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

Date Code(counting from left to right) :
1st code: year code, the last digit of Christian year
2nd code : month code, Jan→A, Feb→B, Mar→C, Apr→D, May→E, Jun→F, Jul→G, Aug→H, Sep→J, Oct→K, Nov→L, Dec→M
3rd and 4th codes : production serial number, 01~99

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	2.20	2.40	0.087	0.094	D	6.35	6.65	0.250	0.262
A1	1.02	1.27	0.040	0.050	D1	5.20	5.40	0.205	0.213
B	1.35	1.65	0.053	0.065	E	5.40	5.70	0.213	0.224
b	0.50	0.70	0.020	0.028	e	2.30 TYP		0.091 TYP	
b1	0.70	0.90	0.028	0.035	e1	4.50	4.70	0.177	0.185
c	0.43	0.58	0.017	0.023	L	7.50	7.90	0.295	0.311
c1	0.43	0.58	0.017	0.023	L1	1.20	1.60	0.047	0.063

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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