

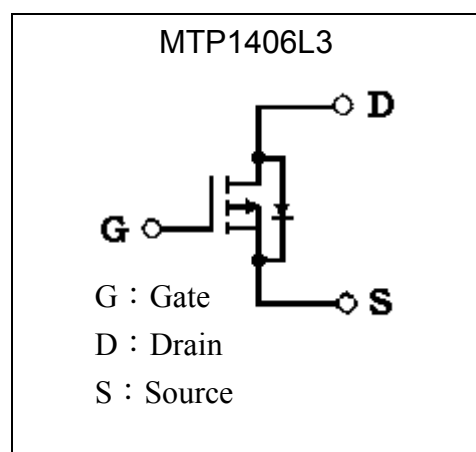
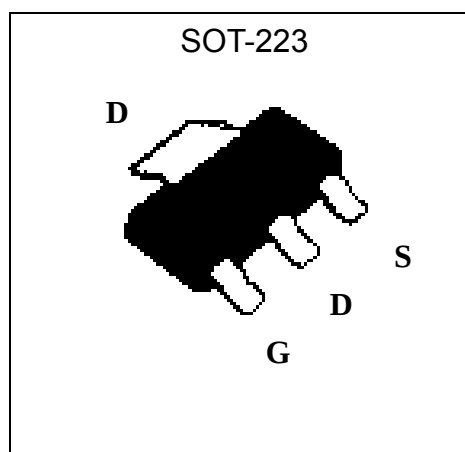
P-Channel Enhancement Mode Power MOSFET

MTP1406L3

Features

- Simple Drive Requirement
- Low On-resistance
- Fast switching Characteristic
- Pb-free lead plating package

BV_{DSS}	-60V
I_D	-4.8A
R_{DS(on)}@V_{GS}=-10V, I_D=-4A	75mΩ (typ.)
R_{DS(on)}@V_{GS}=-10V, I_D=-1.5A	74mΩ (typ.)
R_{DS(on)}@V_{GS}=-4.5V, I_D=-2A	99mΩ (typ.)

Symbol

Outline

Absolute Maximum Ratings (T_A=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V _{DS}	-60	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current @ T _A =25°C	I _D	-4.8 *1	A
Continuous Drain Current @ T _A =70°C	I _D	-3.8 *1	A
Pulsed Drain Current	I _{DM}	-20 *1	A
Total Power Dissipation (T _A =25°C)	P _d	2.7 *2	W
Linear Derating Factor		0.02	W/°C
Operating Junction and Storage Temperature	T _j , T _{stg}	-55~+150	°C

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

*2. Surface mounted on 1 in² copper pad of FR-4 board; 120°C/W when mounted on minimum copper pad

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	14	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	45 (Note)	$^{\circ}\text{C/W}$

Note : Surface mounted on 1 in² copper pad of FR-4 board; 120 $^{\circ}\text{C/W}$ when mounted on minimum copper pad

Characteristics (T_j=25 $^{\circ}\text{C}$, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-60	-	-	V	V _{GS} =0, I _D =-250μA
ΔBV _{DSS} /ΔT _j	-	-0.04	-	V/°C	Reference to 25°C, I _D =-1mA
V _{GS(th)}	-1.0	-1.9	-2.5	V	V _{DS} = V _{GS} , I _D =-250μA
G _{FS}	-	5	-	S	V _{DS} =-10V, I _D =-3A
I _{GSS}	-	-	±100	nA	V _{GS} =±20
I _{DSS}	-	-	-1	μA	V _{DS} =-48V, V _{GS} =0
I _{DSS}	-	-	-25	μA	V _{DS} =-48V, V _{GS} =0, T _j =70°C
*R _{DS(ON)}	-	75	90	mΩ	V _{GS} =-10V, I _D =-4A
	-	74	90		V _{GS} =-10V, I _D =-2A
	-	99	120		V _{GS} =-4.5V, I _D =-2A
Dynamic					
*Q _g	-	14	-	nC	I _D =-4.8A, V _{DS} =-30V, V _{GS} =-10V
*Q _{gs}	-	3.2	-		
*Q _{gd}	-	5.2	-		
*t _{d(ON)}	-	10	-	ns	V _{DS} =-30V, I _D =-1A, V _{GS} =-10V, R _G =6Ω
*t _r	-	7	-		
*t _{d(OFF)}	-	43	-		
*t _f	-	25	-		
C _{iss}	-	939	-	pF	V _{GS} =0V, V _{DS} =-25V, f=1MHz
C _{oss}	-	54	-		
C _{rss}	-	39	-		
Source-Drain Diode					
*V _{SD}	-	-	-1.2	V	I _S =-2A, V _{GS} =0V
*t _{rr}	-	29	-	ns	I _S =-4.8A, V _{GS} =0, dI/dt=100A/μs
*Q _{rr}	-	20	-	nC	

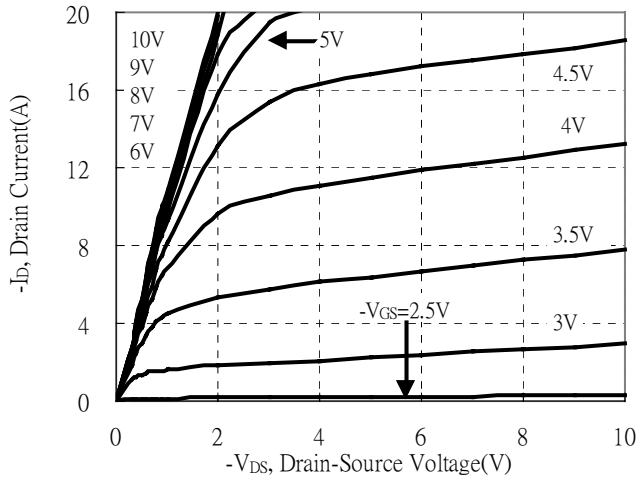
*Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

Ordering Information

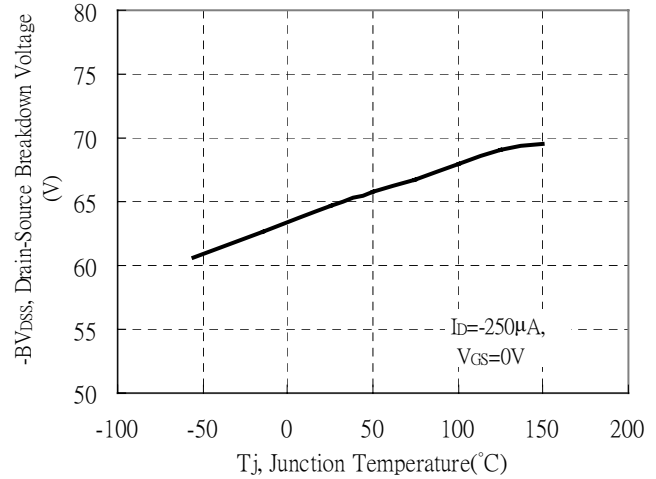
Device	Package	Shipping	Marking
MTP1406L3	SOT-223 (Pb-free lead plating package)	2500 pcs / Tape & Reel	1406

Typical Characteristics

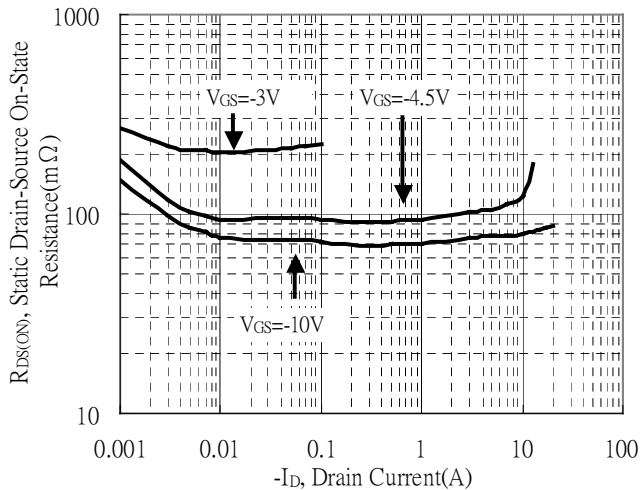
Typical Output Characteristics



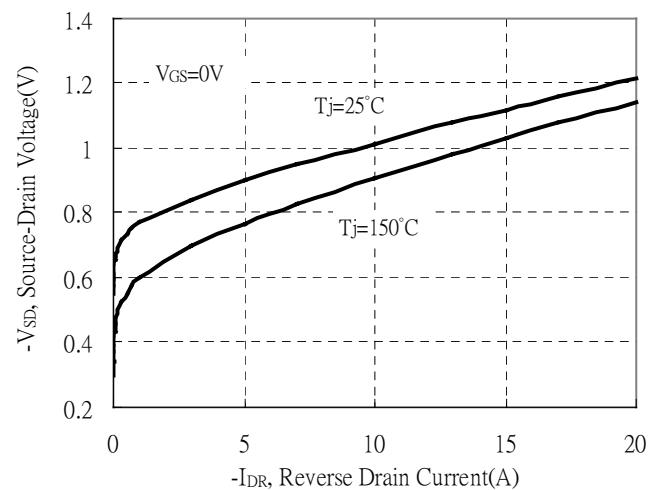
Breakdown Voltage vs Ambient Temperature



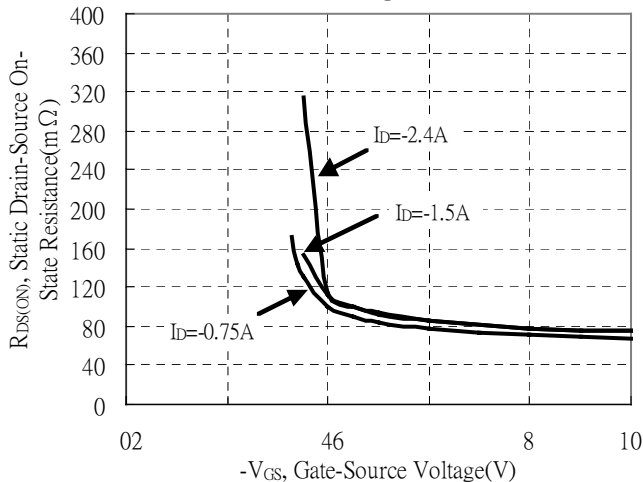
Static Drain-Source On-State resistance vs Drain Current



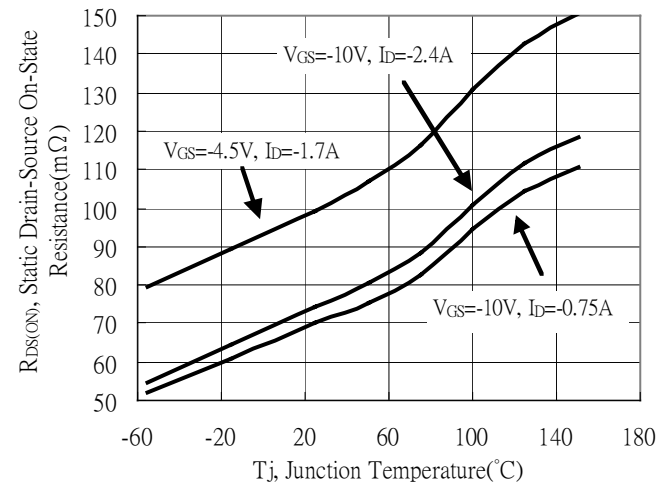
Reverse Drain Current vs Source-Drain Voltage



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

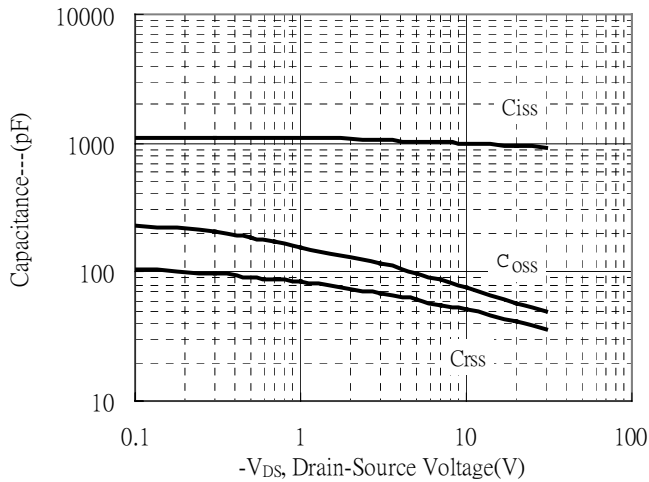


Drain-Source On-State Resistance vs Junction Temperature

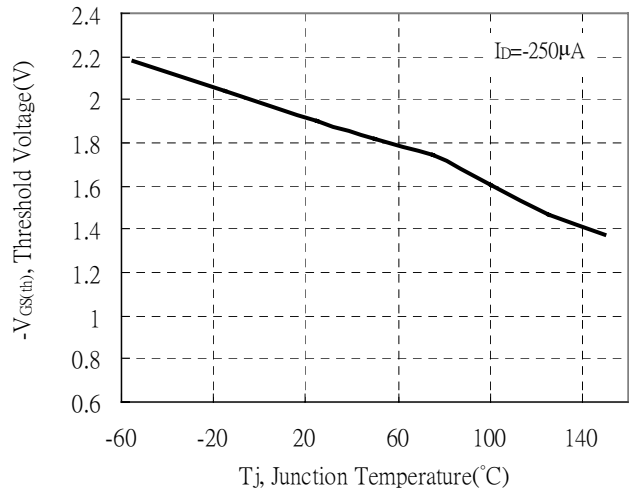


Typical Characteristics(Cont.)

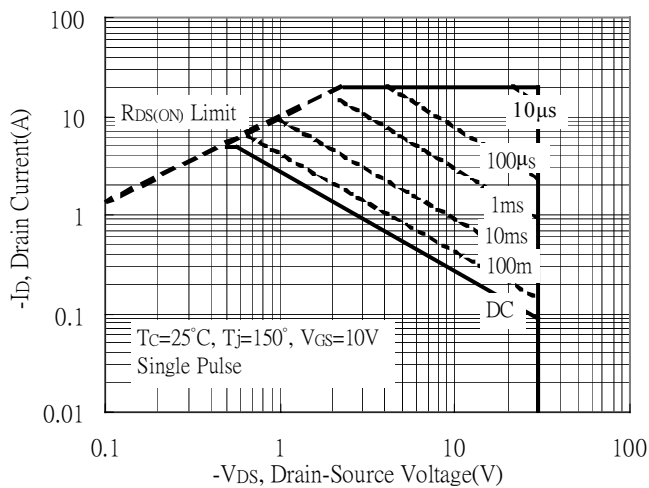
Capacitance vs Drain-to-Source Voltage



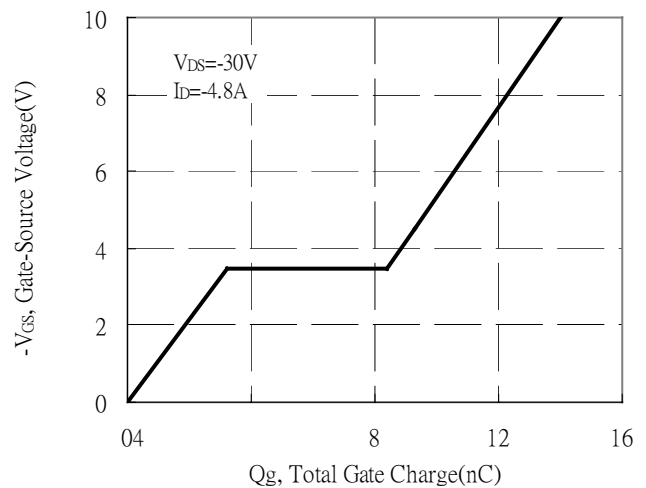
Threshold Voltage vs Junction Temperature



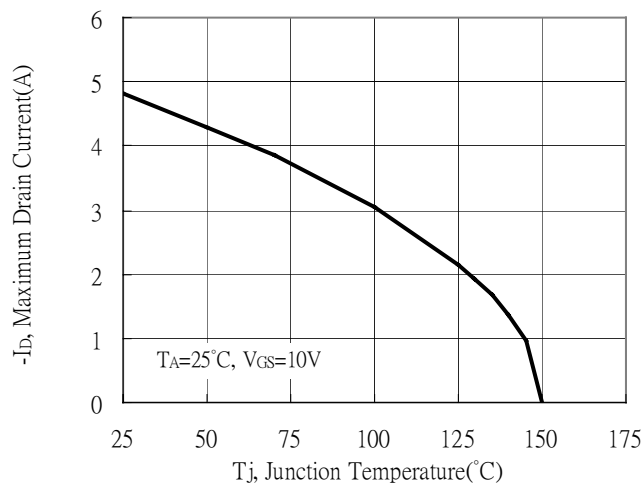
Maximum Safe Operating Area



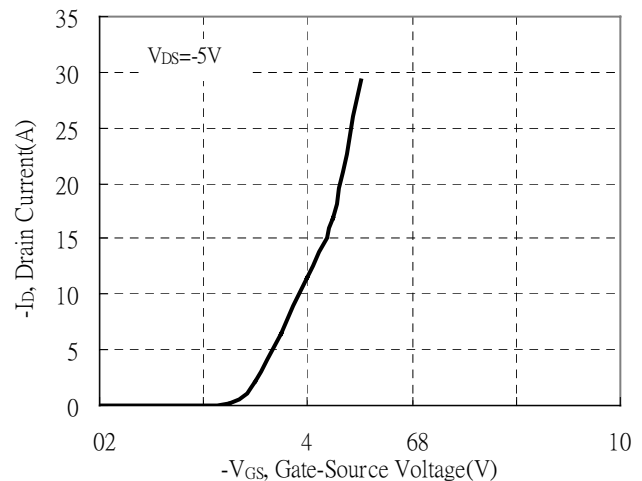
Gate Charge Characteristics



Maximum Drain Current vs Case Temperature

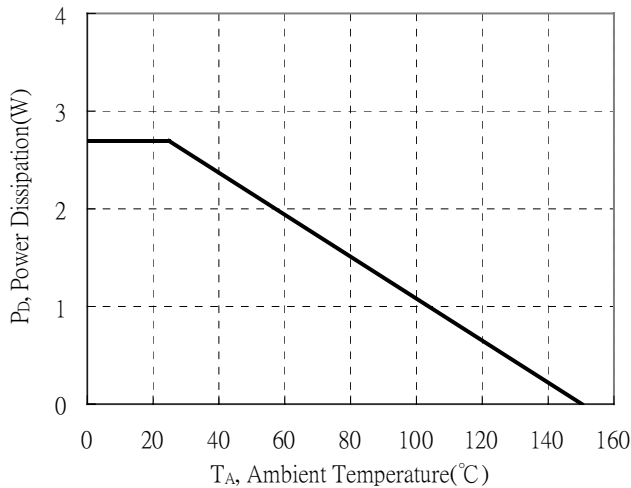


Typical Transfer Characteristics

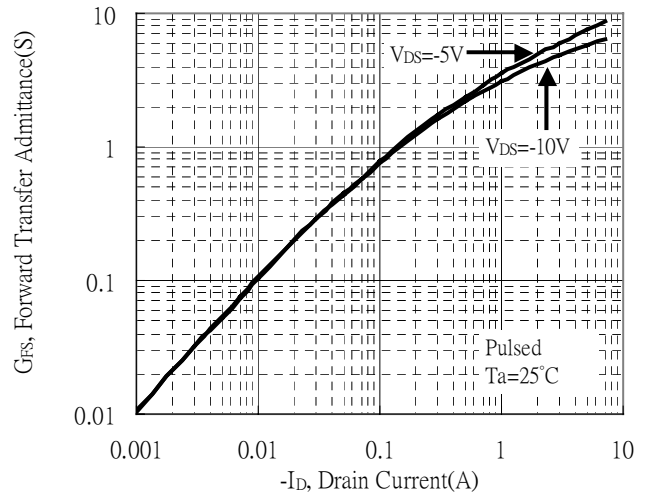


Typical Characteristics(Cont.)

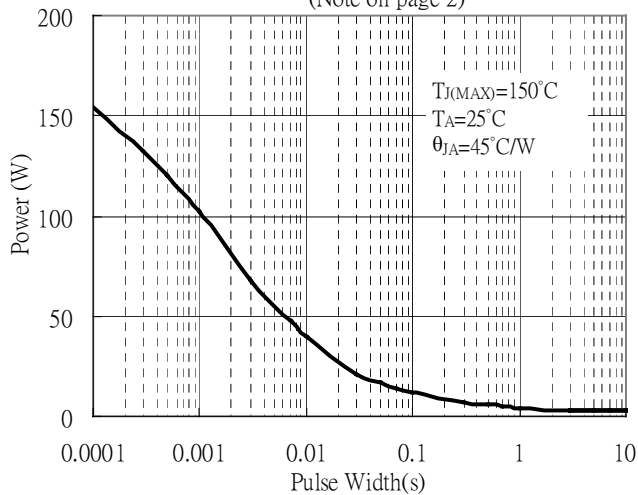
Power Derating Curve



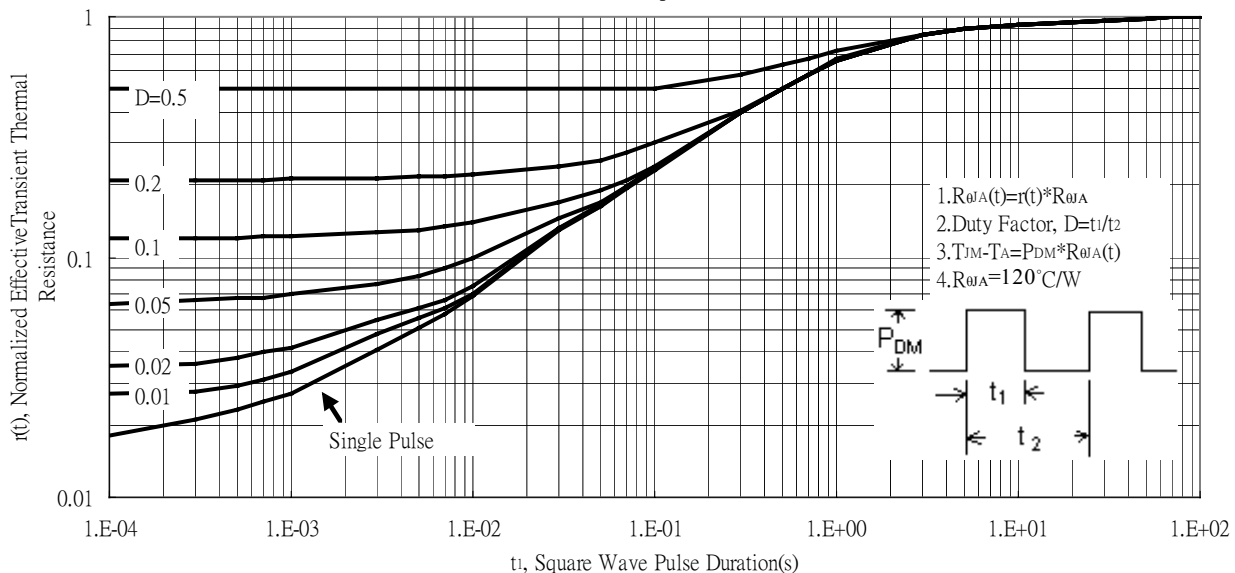
Forward Transfer Admittance vs Drain Current



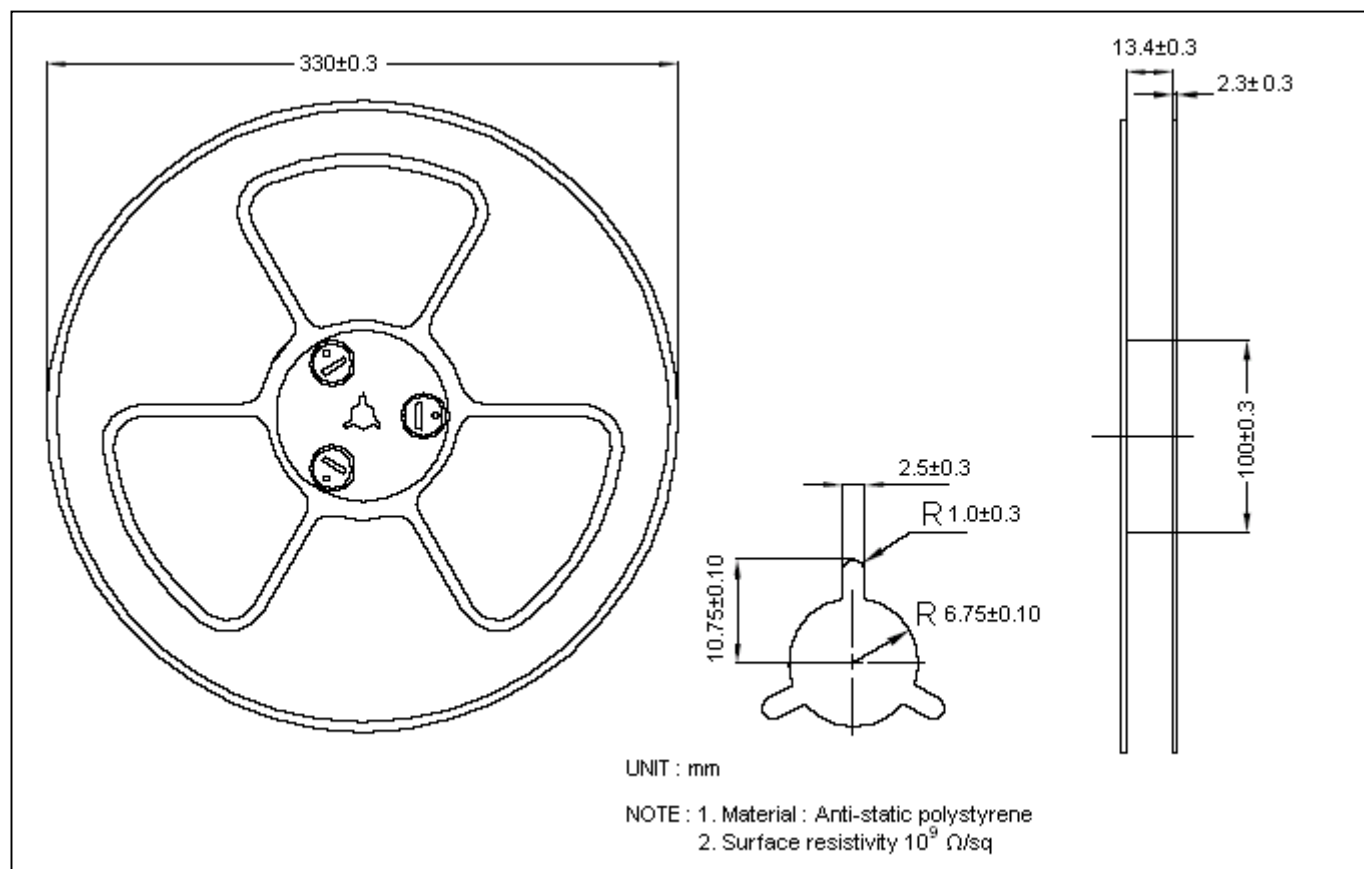
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



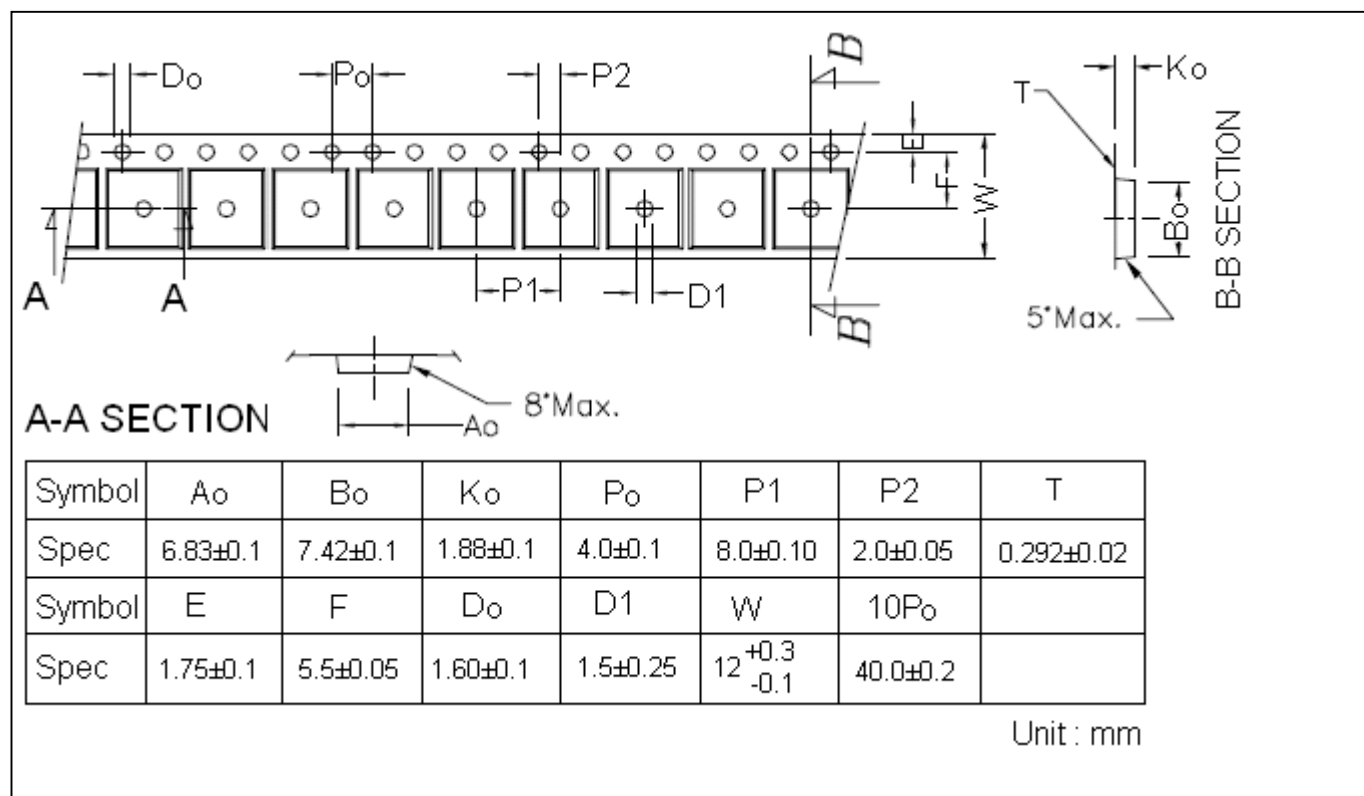
Transient Thermal Response Curves



Reel Dimension



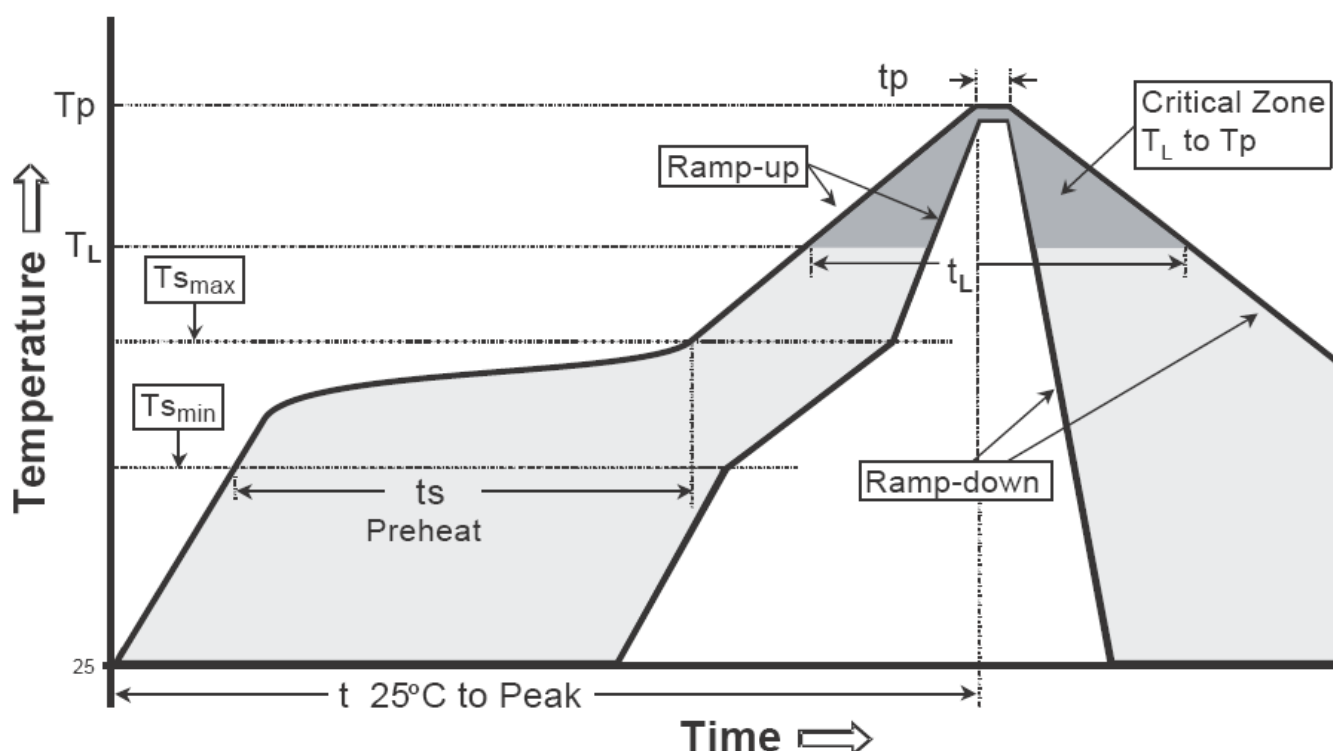
Carrier Tape Dimension



Recommended wave soldering condition

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

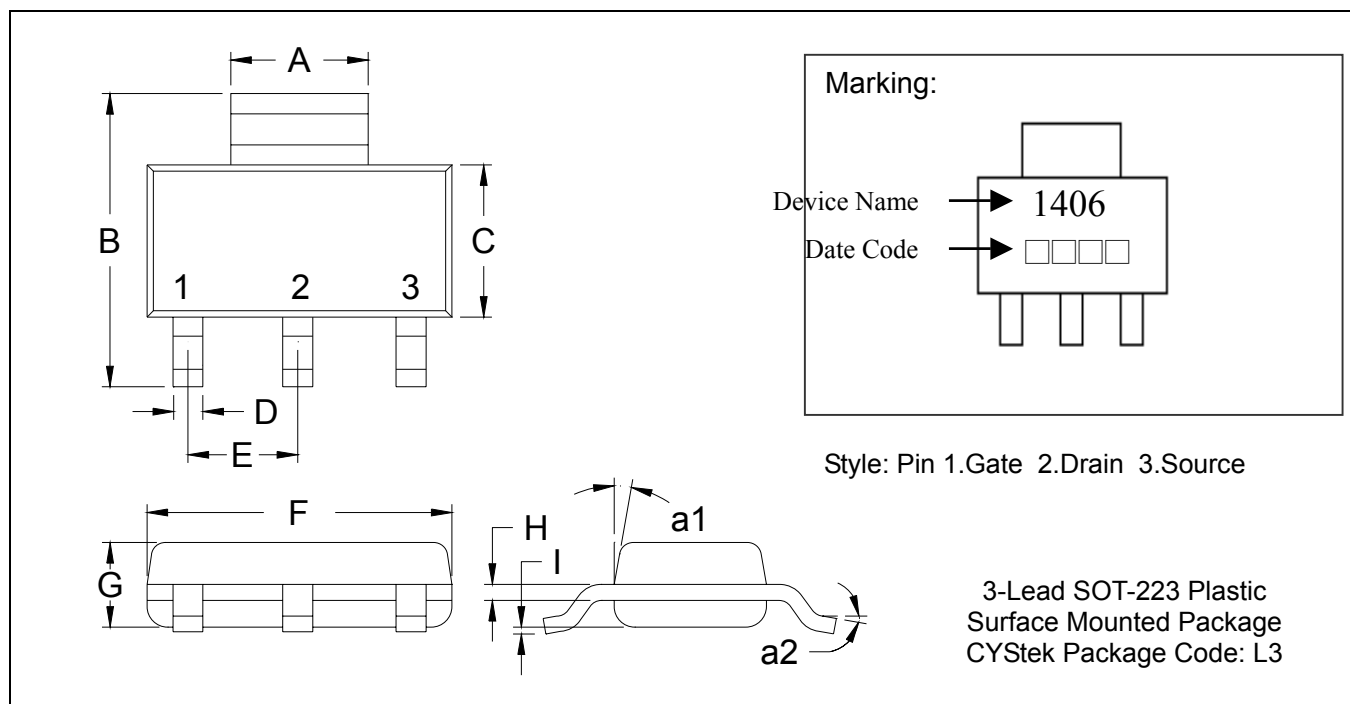
Recommended temperature profile for IR reflow



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.

SOT-223 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1142	0.1220	2.90	3.10	G	0.0551	0.0709	1.40	1.80
B	0.2638	0.2874	6.70	7.30	H	0.0098	0.0138	0.25	0.35
C	0.1299	0.1457	3.30	3.70	I	0.0008	0.0039	0.02	0.10
D	0.0236	0.0315	0.60	0.80	a1	*13°	-	*13°	-
E	*0.0906	-	*2.30	-	a2	0°	10°	0°	10°
F	0.2480	0.2638	6.30	6.70					

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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