P-Channel Logic Level Enhancement Mode MOSFET

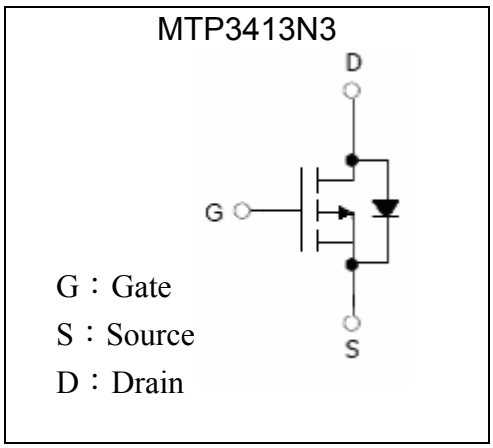
MTP3413N3

BV_{DSS}		-20V
I_D		-4.9A
$R_{DSON(TYP)}$	V_{GS}=-4.5V, I_D=-4.3A	39mΩ
	V_{GS}=-2.5V, I_D=-2.5A	50mΩ
	V_{GS}=-1.8V, I_D=-2A	65mΩ

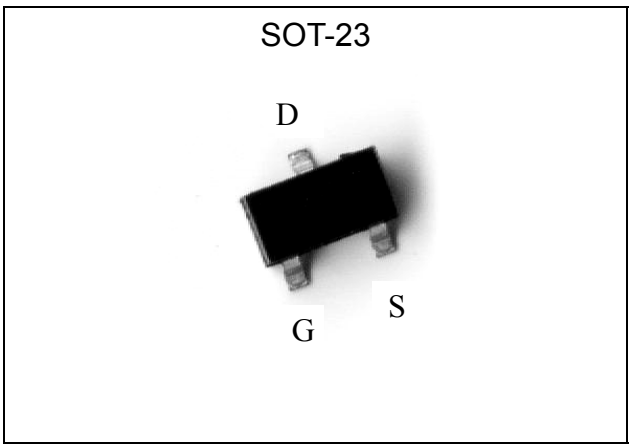
Features

- 1.8V gate rated
- Advanced trench process technology
- High density cell design for ultra low on resistance
- Pb-free lead plating and halogen-free package

Equivalent Circuit



Outline



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±8	V
Continuous Drain Current @T_C=25°C	I_D	-4.9	A
Continuous Drain Current @T_C=100°C	I_D	-3.1	A
Pulsed Drain Current (Note 1&2)	I_{DM}	-35	A
Maximum Power Dissipation @T_A=25°C	P_D	1.38	W
Maximum Power Dissipation @T_A=70°C		0.88	
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C

Note : 1. Pulse width limited by maximum junction temperature.
2. Pulse width≤300μs, duty cycle≤2%

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient (Note)	Rth,ja	90	°C/W

Note : Surface mounted on 1 in² copper pad of FR-4 board, 270°C/W when mounted on minimum copper pad.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0, I_D=-250μA
$V_{GS(th)}$	-0.4	-0.6	-0.95	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0
I_{DSS}	-	-	-1	μA	V_{DS}=-20V, V_{GS}=0
	-	-	-10	μA	V_{DS}=-20V, V_{GS}=0, Tj=55°C
*$R_{DS(ON)}$	-	39	50	mΩ	V_{GS}=-4.5V, I_D=-4.3A
	-	50	60		V_{GS}=-2.5V, I_D=-2.5A
	-	65	75		V_{GS}=-1.8V, I_D=-2.0A
Dynamic					
Ciss	-	1220	-	pF	V_{DS}=-10V, V_{GS}=0, f=1MHz
Coss	-	103	-		
Crss	-	92	-		
*$t_{d(ON)}$	-	12.5	-	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-4.5V, R_D=10Ω, R_G=6Ω
*t_r	-	12	-		
*$t_{d(OFF)}$	-	70	-		
*t_f	-	20	-		
*Qg	-	10	-	nC	V_{DS}=-10V, I_D=-4.3A, V_{GS}=-4.5V
*Qgs	-	1.9	-		
*Qgd	-	2.7	-		
Source-Drain Diode					
*I_{SD}	-	-	-1.3	A	
*I_{SM}	-	-	-35		
*V_{SD}	-	-0.76	-1	V	V_{GS}=0V, I_S=-1.3A
*trr	-	23	-	ns	I_S=-1.3A, V_{GS}=0V, dI/dt=100A/μs
*Qrr	-	8.5	-	nC	

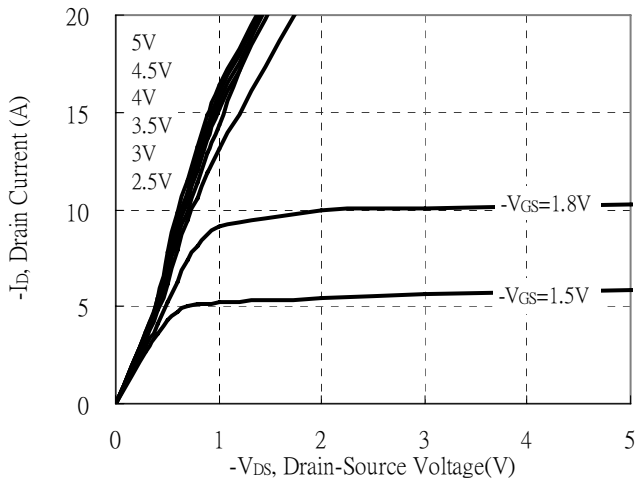
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

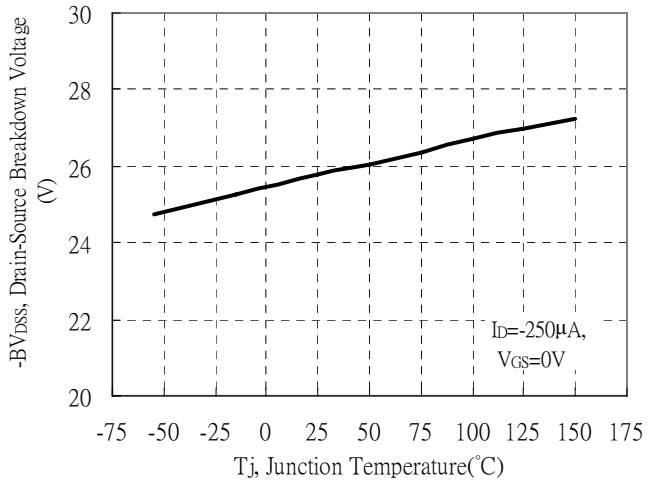
Device	Package	Shipping
MTP3413N3	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Typical Characteristics

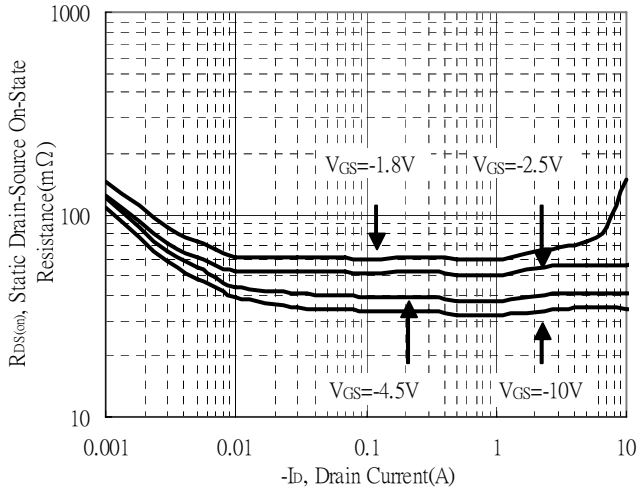
Typical Output Characteristics



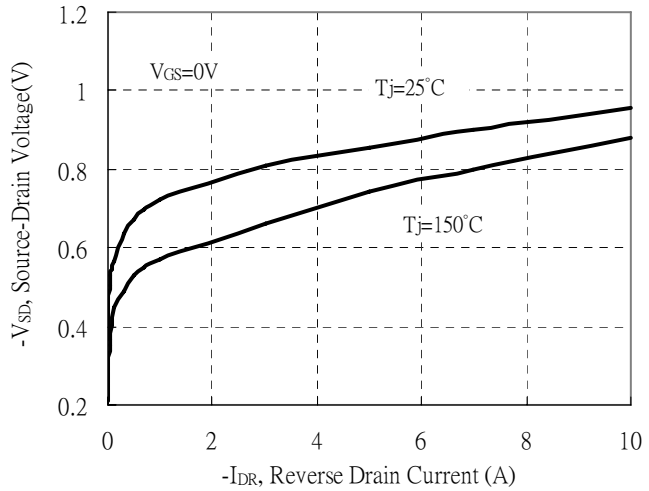
Brekdown Voltage vs Ambient Temperature



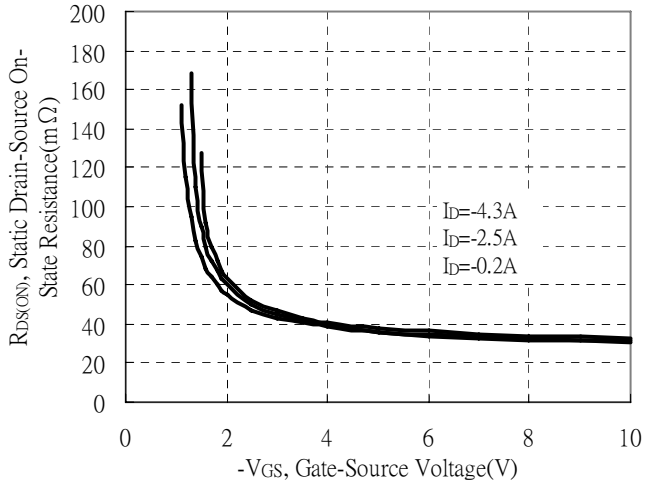
Static Drain-Source On-State resistance vs Drain Current



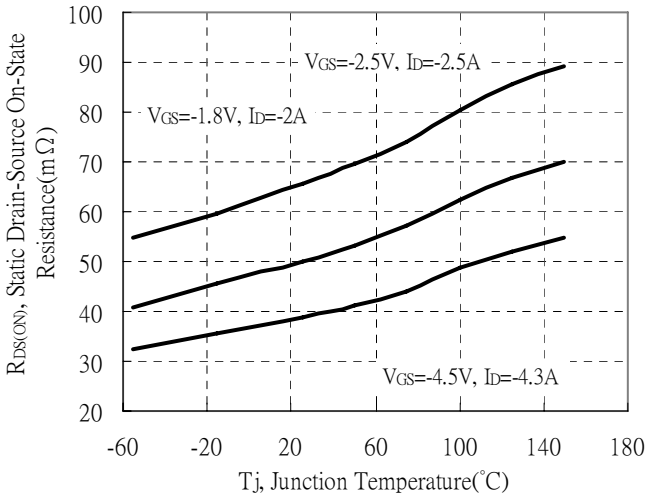
Reverse Drain Current vs Source-Drain Voltage



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

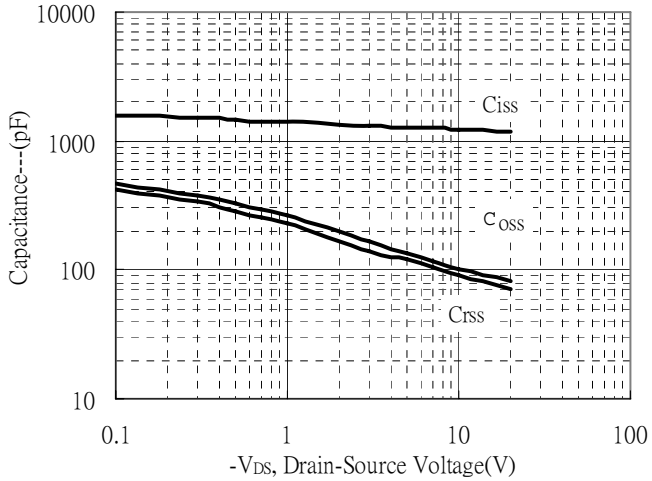


Drain-Source On-State Resistance vs Junction Tempearture

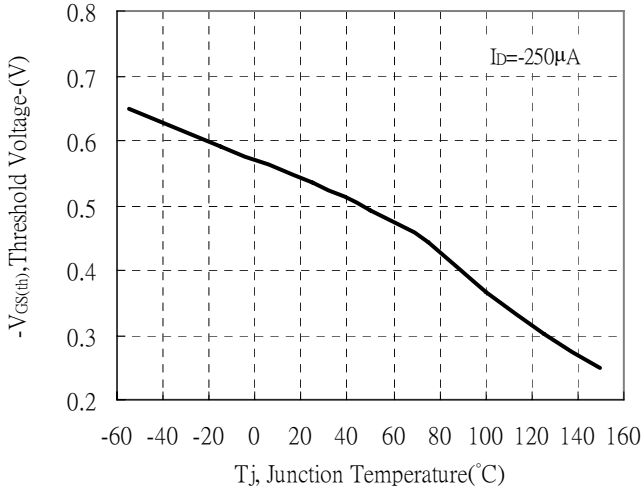


Typical Characteristics(Cont.)

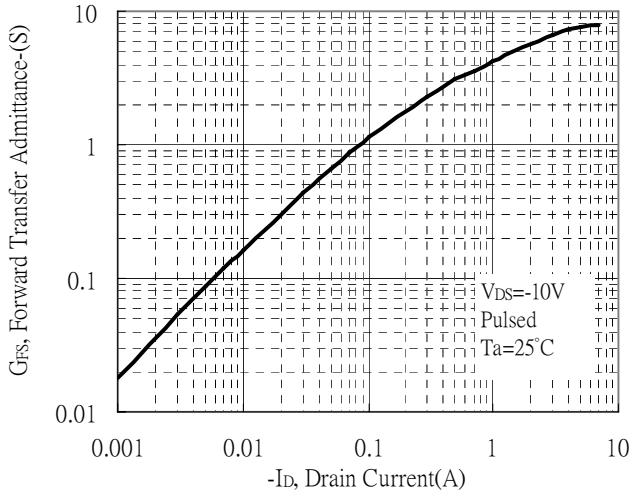
Capacitance vs Drain-to-Source Voltage



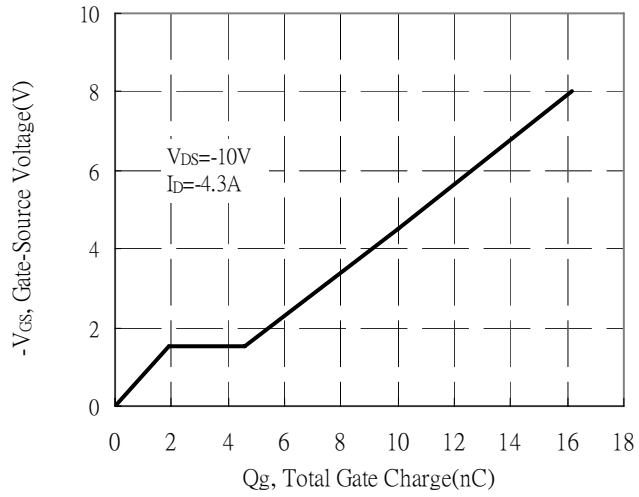
Threshold Voltage vs Junction Tempearture



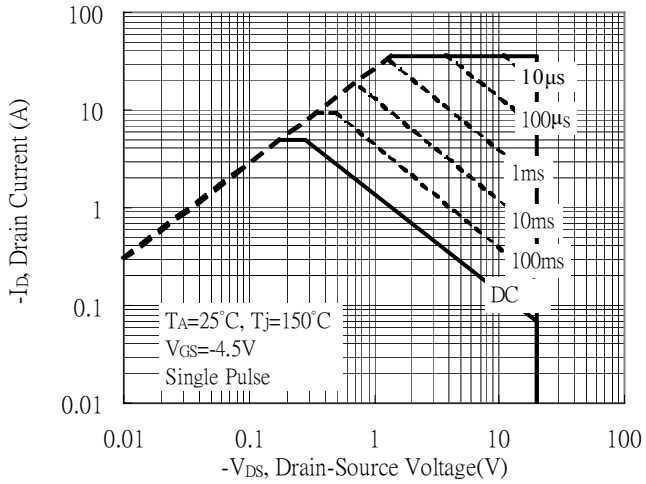
Forward Transfer Admittance vs Drain Current



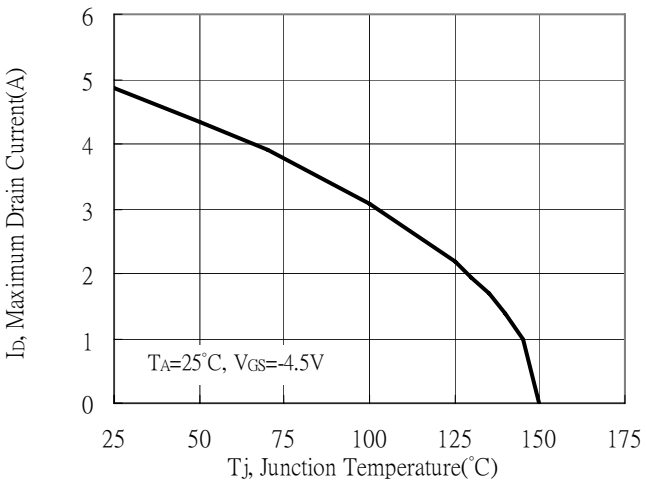
Gate Charge Characteristics



Maximum Safe Operating Area

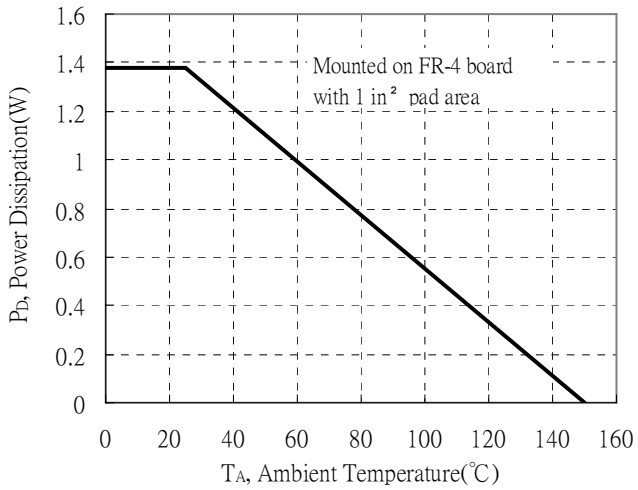


Maximum Drain Current vs JunctionTemperature

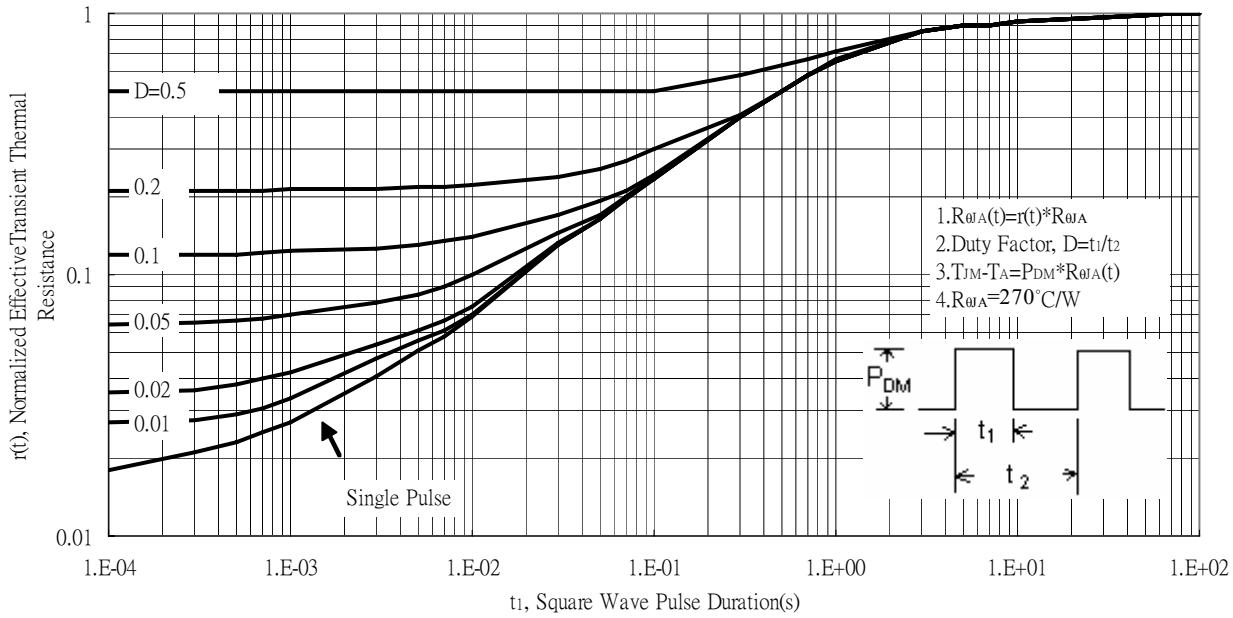


Typical Characteristics(Cont.)

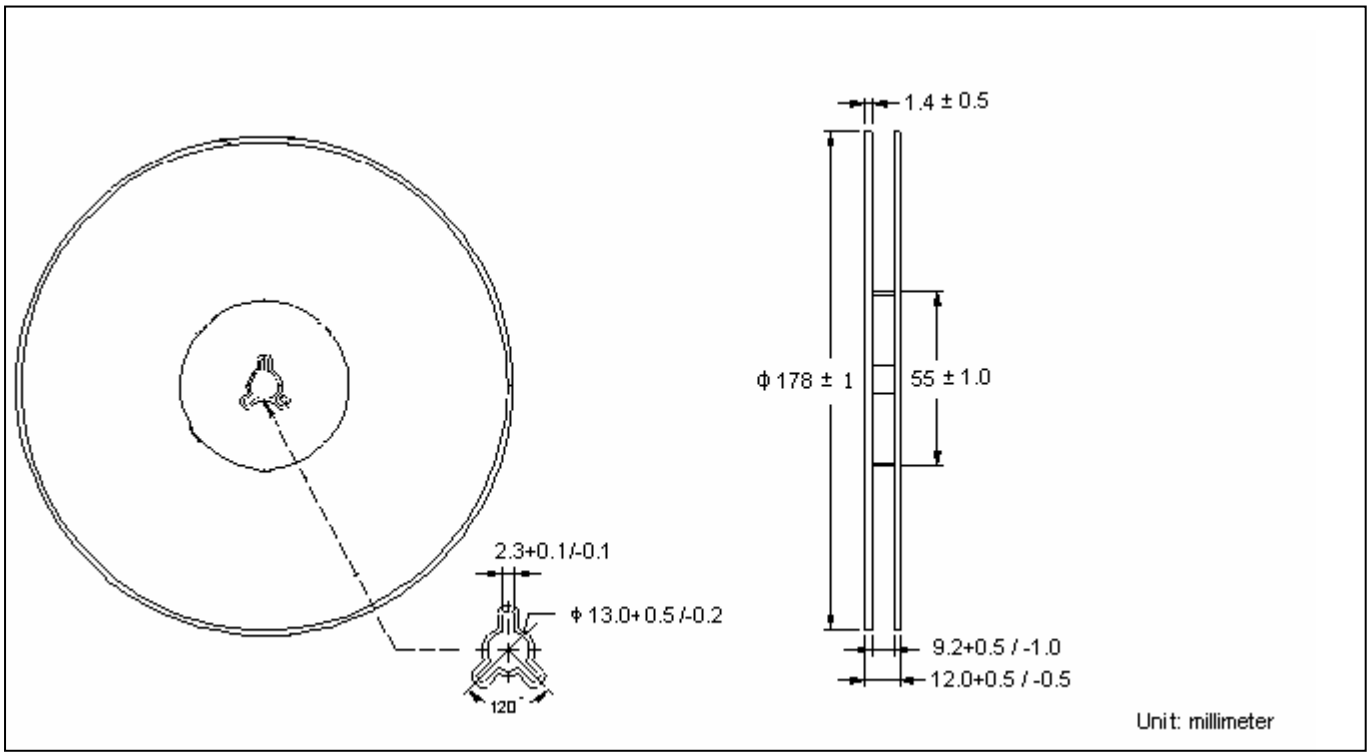
Power Derating Curve



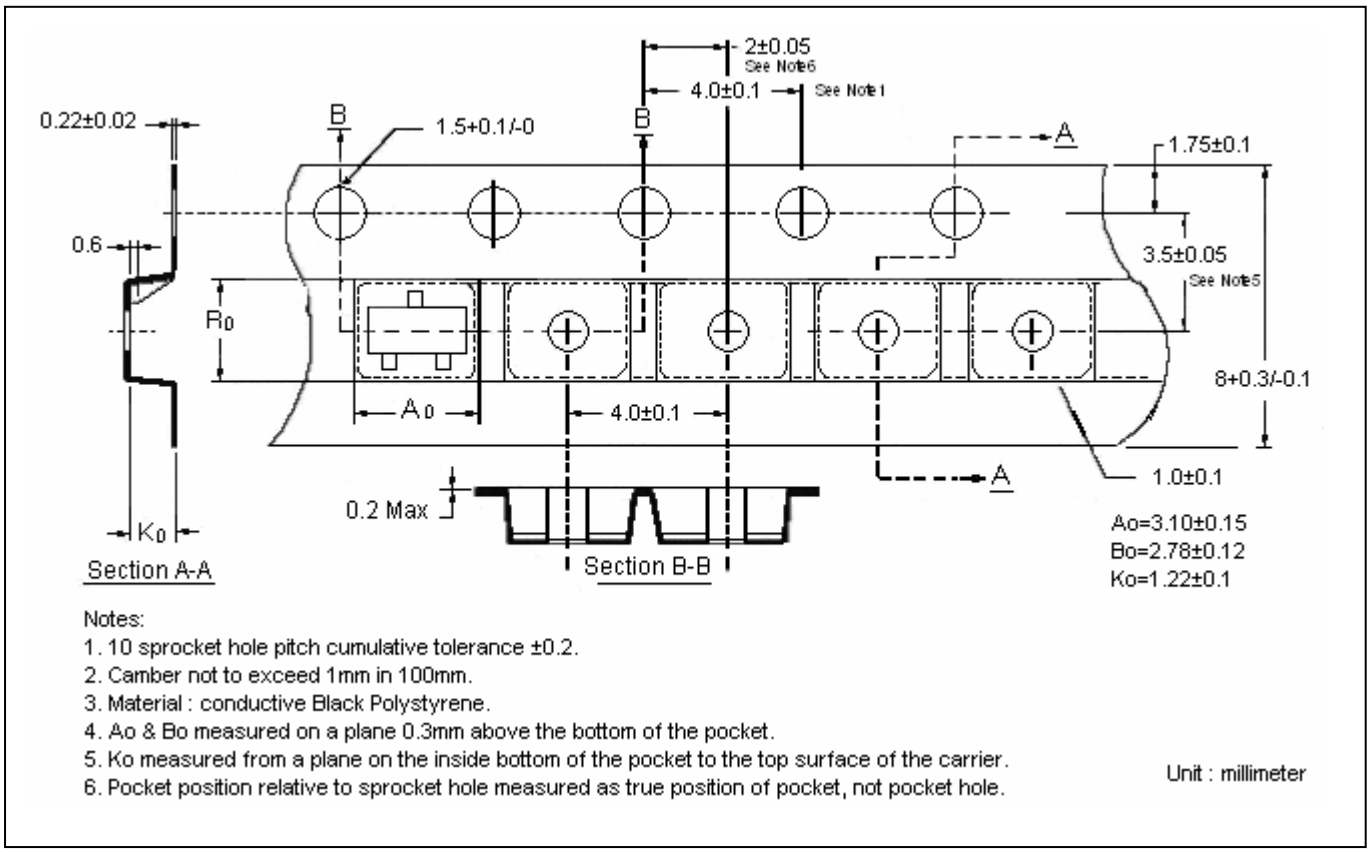
Transient Thermal Response Curves



Reel Dimension



Carrier Tape Dimension



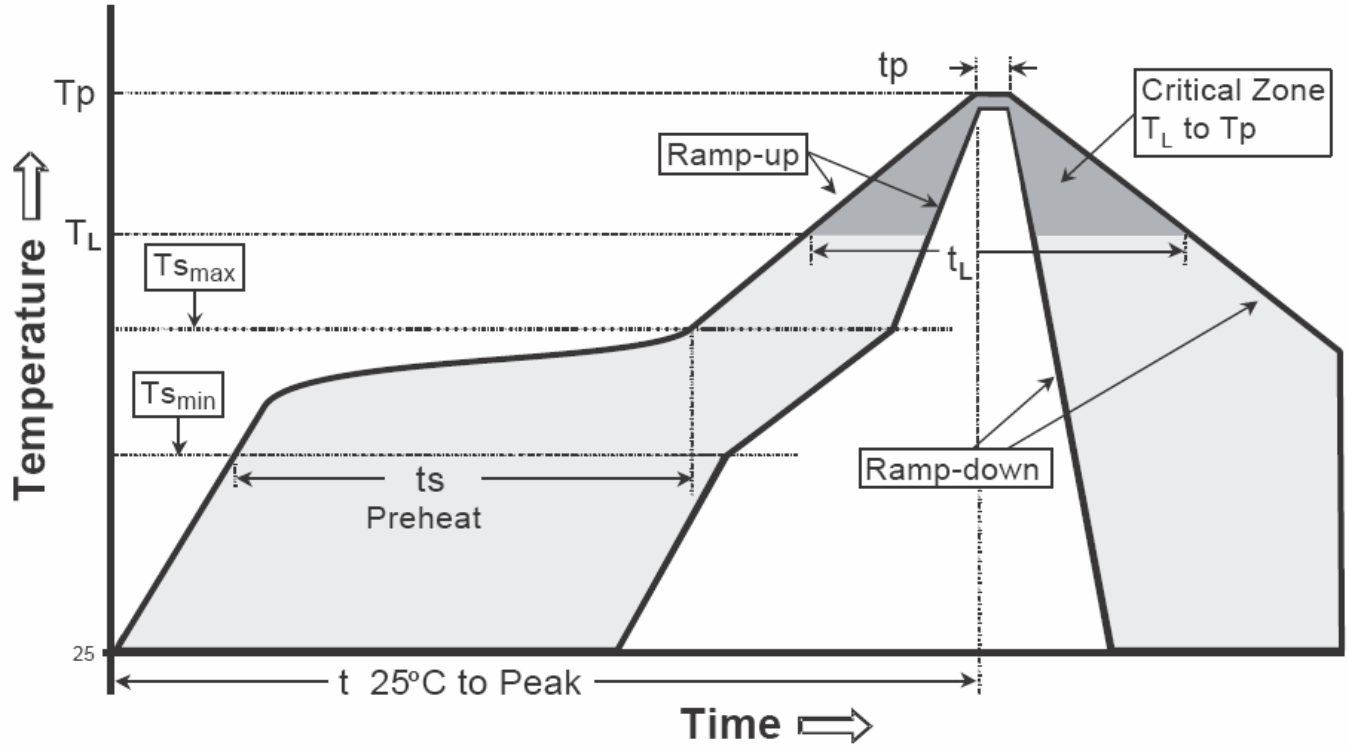
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Unit : millimeter

Recommended wave soldering condition

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

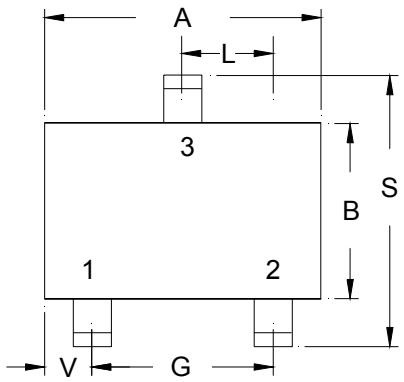
Recommended temperature profile for IR reflow

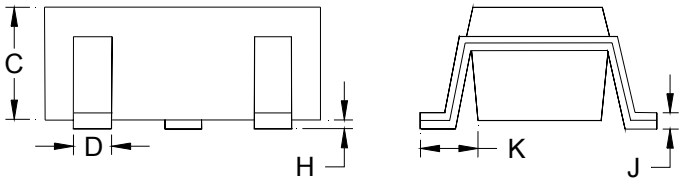


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL)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

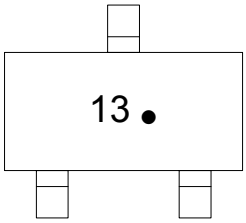
Note : All temperatures refer to topside of the package, measured on the package body surface.

SOT-23 Dimension





Marking:



3-Lead SOT-23 Plastic
Surface Mounted Package
CYStek Package Code: N3

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

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0032	0.0079	0.08	0.20
B	0.0472	0.0669	1.20	1.70	K	0.0118	0.0266	0.30	0.67
C	0.0335	0.0512	0.89	1.30	L	0.0335	0.0453	0.85	1.15
D	0.0118	0.0197	0.30	0.50	S	0.0830	0.1161	2.10	2.95
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0000	0.0040	0.00	0.10					

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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