

P-Channel Enhancement Mode MOSFET / Schottky Diode combination

MTA130PK02DFA6

	P-MOSFET		Schottky Diode
BV_{DSS}	-20V	V_R	20V
I_D	-3.3A ($V_{GS}=-4.5V$)	$I_{F(AV)}$	2A
$R_{DS(on)(TYP.)}$	79m Ω ($V_{GS}=-4.5V$)	$V_{F(TYP.)}$	0.3V ($I_F=100mA$)
	95m Ω ($V_{GS}=-2.5V$)		0.44V ($I_F=500mA$)
	280m Ω ($V_{GS}=-1.8V$)		

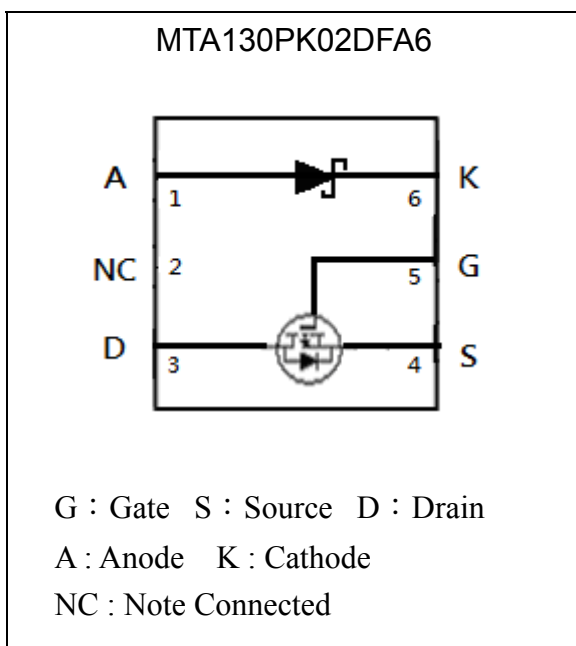
Description

The MTA130PK02DFA6 consists of a P-channel enhancement-mode MOSFET and a Schottky diode in a single DFN2*2-6L package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness. The DFN2*2-6L package is universally preferred for all commercial-industrial surface mount applications.

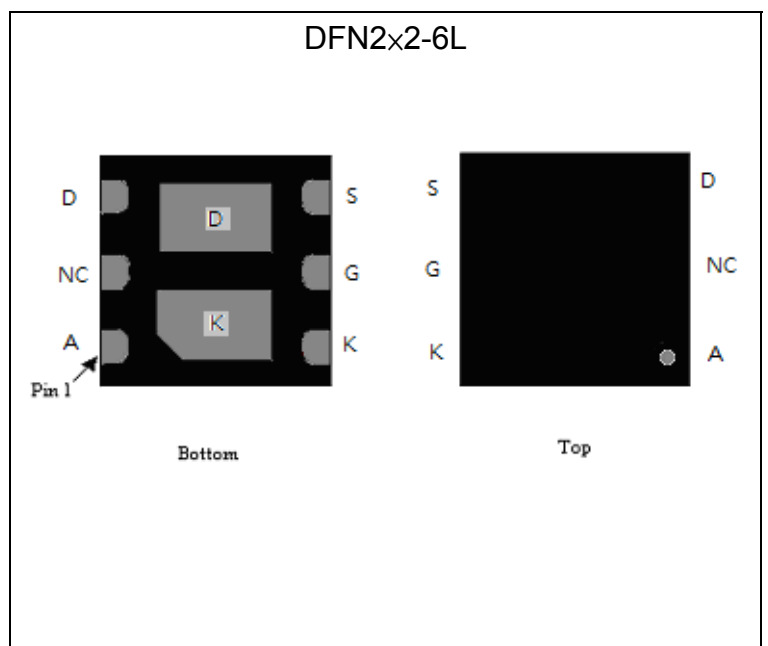
Features

- Simple drive requirement
- Low gate charge
- Low on-resistance
- Fast switching speed
- Integrated ultra low V_F Schottky diode
- Pb-free lead plating and halogen-free package

Equivalent Circuit



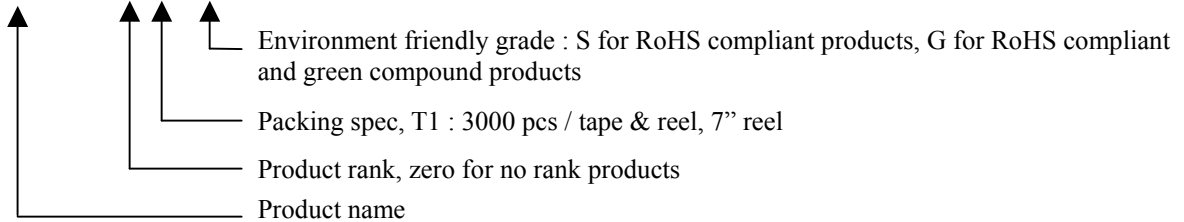
Outline





Ordering Information

Device	Package	Shipping
MTA130PK02DFA6-0-T1-G	DFN2x2-6L (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
P-Channel MOSFET			
Drain-Source Breakdown Voltage	BV _{DSS}	-20	V
Gate-Source Voltage	V _{GS}	±8	
Continuous Drain Current @T _A =25 °C (Note 1)	I _D	-3.3	A
Continuous Drain Current @T _A =70 °C (Note 1)		-2.6	
Pulsed Drain Current (Note 2)	I _{DM}	-13.2	
Schottky Diode			
Maximum DC blocking voltage	V _R	20	V
Maximum instantaneous forward voltage, I _F =1A (Note 1)	V _F	0.50	
Average forward rectified current	I _{F(AV)}	2	A
Peak forward surge current @8.3ms single half sine wave superimposed on rated load (JEDEC method)	I _{FSM}	20	
Total Power Dissipation (Note 1)	P _D	1.38	W
Linear Derating Factor		0.01	W / °C
Operating Junction and Storage Temperature	T _j , T _{stg}	-55~+150	°C

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec
2.Pulse width limited by maximum junction temperature

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{θJC}	80	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{θJA}	90 (Note)	

Note :.Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec; 195°C/W when mounted on minimum copper pad



P-Channel MOSFET Electrical Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-20	-	-	V	V _{GS} =0V, I _D =-250μA
ΔBV _{DSS} /ΔT _j	-	-7	-	mV/°C	Reference to 25°C, I _D =-1mA
V _{GS(th)}	-	-0.7	-1.2	V	V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±8V, V _{DS} =0V
I _{DSS}	-	-	-1	μA	V _{DS} =-16V, V _{GS} =0V
	-	-	-25		V _{DS} =-16V, V _{GS} =0V, T _j =70°C
*R _{DS(ON)}	-	79	95	mΩ	I _D =-2.5A, V _{GS} =-4.5V
	-	95	125		I _D =-2A, V _{GS} =-2.5V
	-	120	180		I _D =-1A, V _{GS} =-1.8V
*G _{FS}	-	4.5	-	S	V _{DS} =-10V, I _D =-2A
Dynamic					
C _{iSS}	-	636	-	pF	V _{DS} =-20V, V _{GS} =0V, f=1MHz
C _{oSS}	-	47	-		
C _{rSS}	-	44	-		
*t _{d(ON)}	-	3.8	-	ns	V _{DS} =-10V, I _D =-2.8A, V _{GS} =-10V, R _G =1Ω
*t _r	-	14.8	-		
*t _{d(OFF)}	-	46.2	-		
*t _f	-	4.8	-		
*Q _g	-	8	-	nC	V _{DS} =-15V, I _D =-2.8A, V _{GS} =-4.5V
*Q _{gs}	-	1.2	-		
*Q _{gd}	-	1.9	-		
Source-Drain Diode					
*V _{SD}	-	-0.82	-1.2	V	V _{GS} =0V, I _S =-1.2A
*t _{rr}	-	6	-	ns	I _F =-1.6A, V _{GS} =0V, dI _F /dt=100A/μs
*Q _{rr}	-	1.7	-	nC	

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

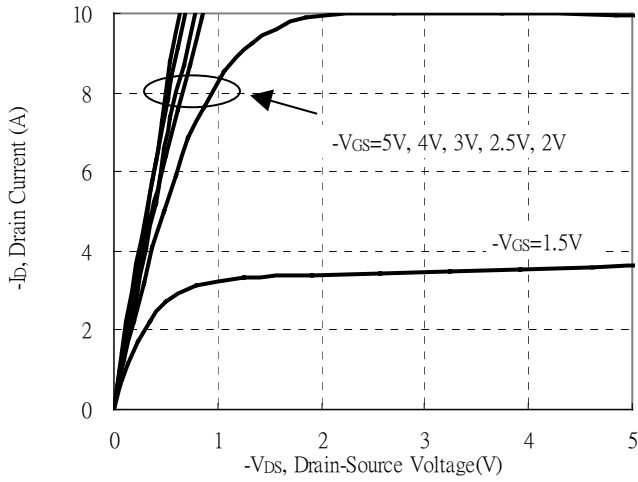
Schottky Diode Electrical Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
V _R	20	-	-	V	I _F =250μA
V _F	-	0.3	0.4		I _F =100mA
	-	0.44	0.5		I _F =500mA
I _R	-	-	100	μA	V _R =5V
	-	-	150		V _R =10V
	-	-	300		V _R =20V
C _D		55		pF	V _R =5V, f=1MHz

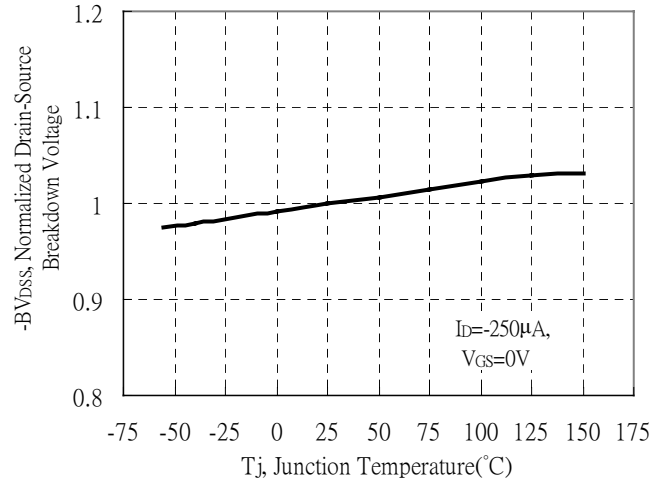
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

P-channel MOSFET Typical Characteristics

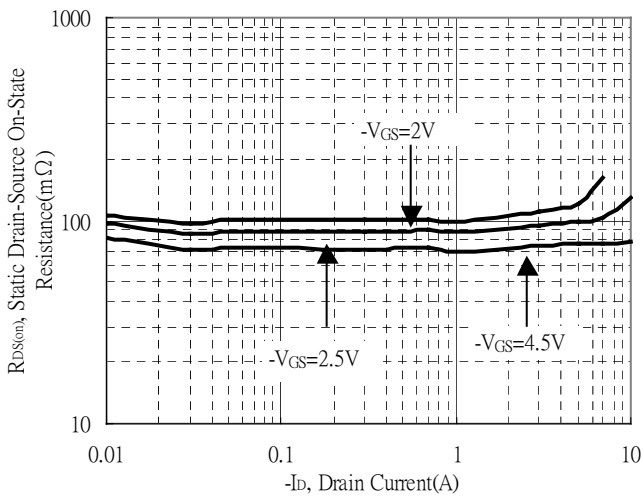
Typical Output Characteristics



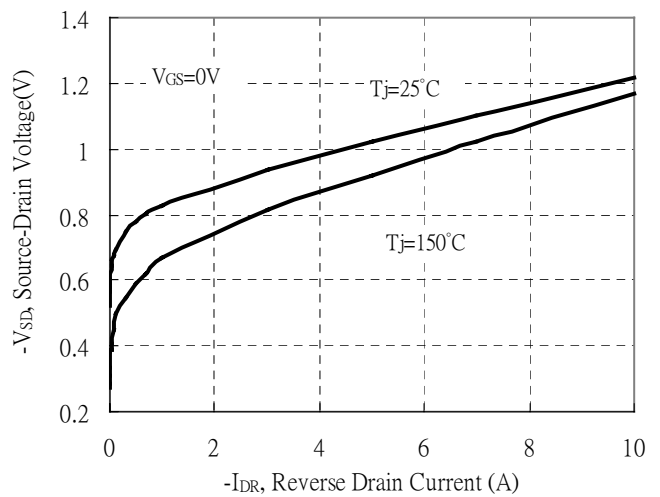
Breakdown Voltage vs Ambient Temperature



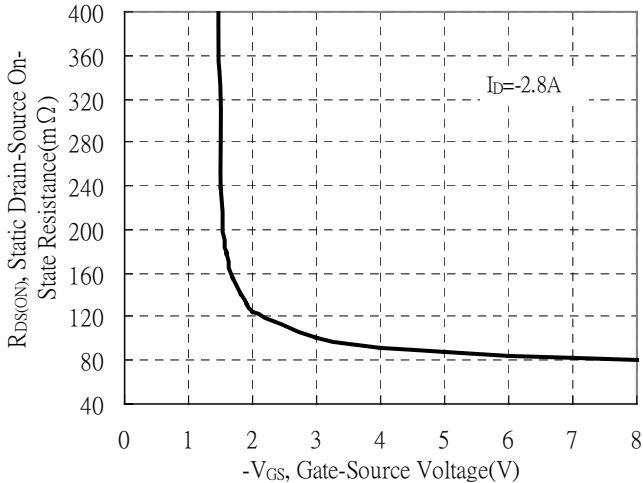
Static Drain-Source On-State resistance vs Drain Current



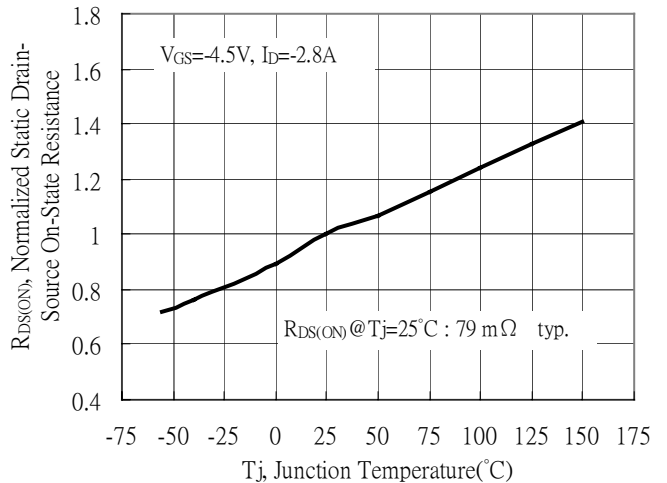
Reverse Drain Current vs Source-Drain Voltage



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

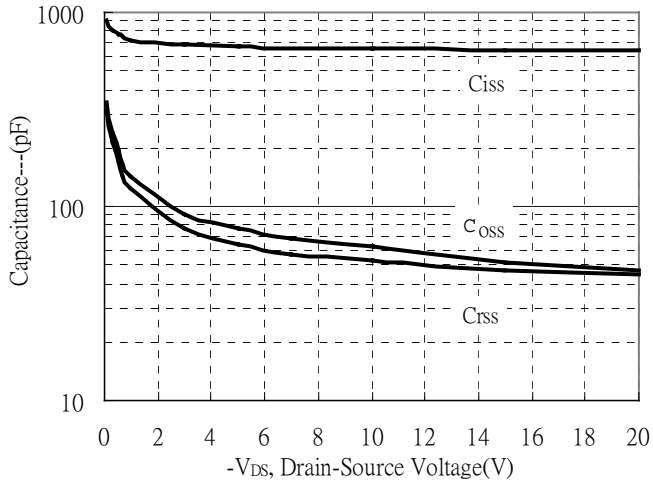


Drain-Source On-State Resistance vs Junction Temperature

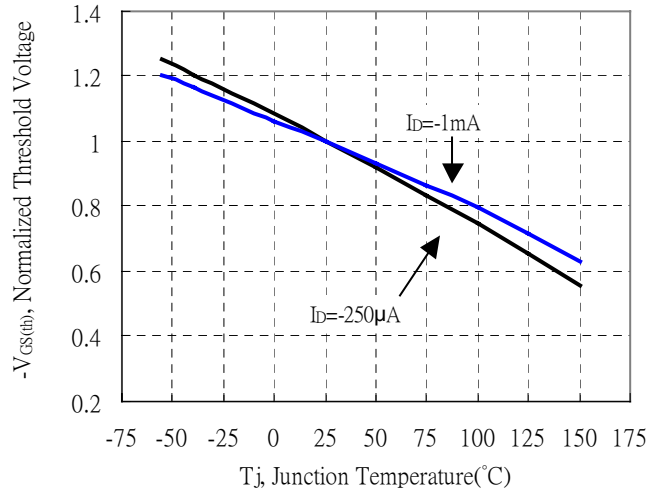


P-channel MOSFET Typical Characteristics(Cont.)

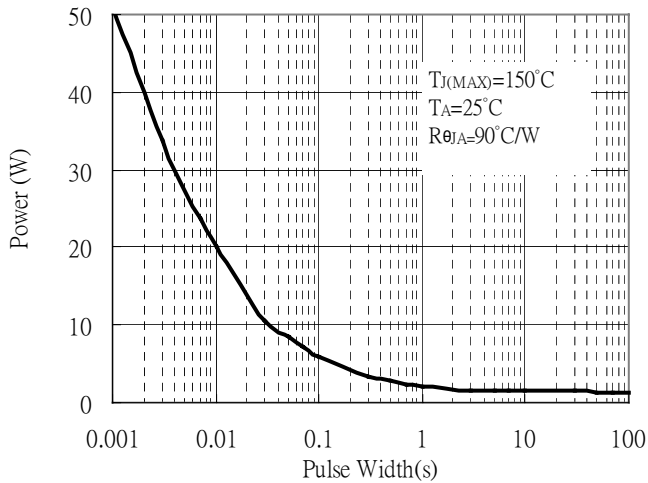
Capacitance vs Drain-to-Source Voltage



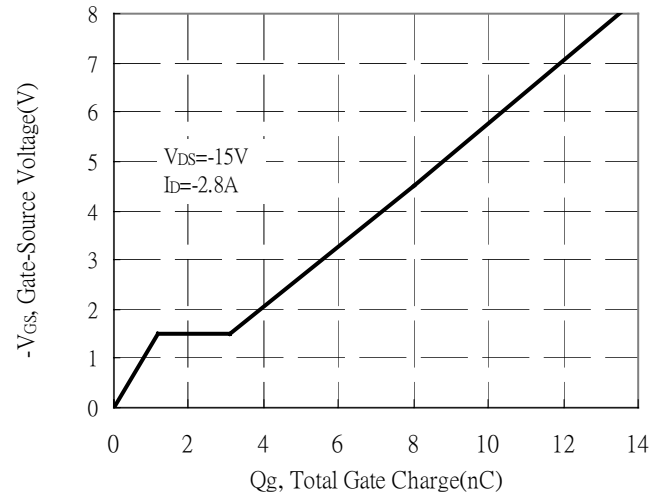
Threshold Voltage vs Junction Temperature



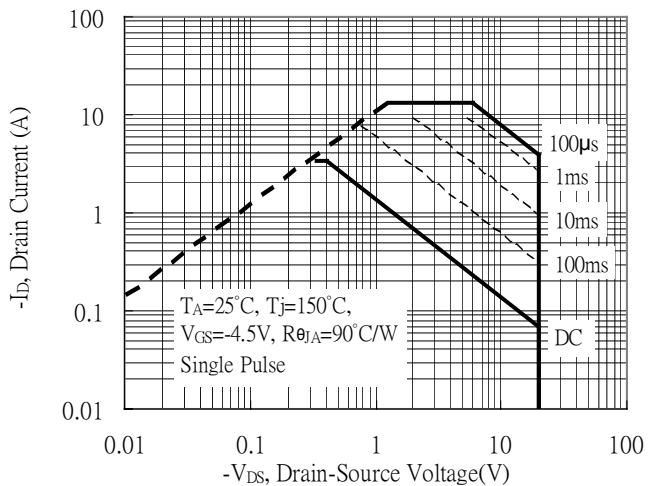
Single Pulse Power Rating, Junction to Ambient
 (Note 1 on page 2)



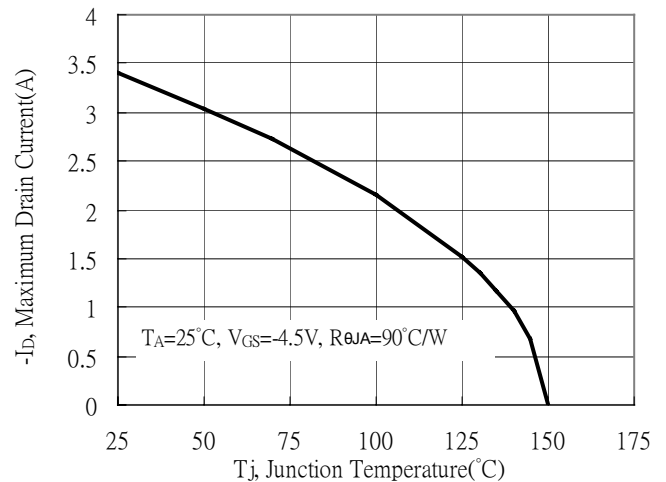
Gate Charge Characteristics



Maximum Safe Operating Area

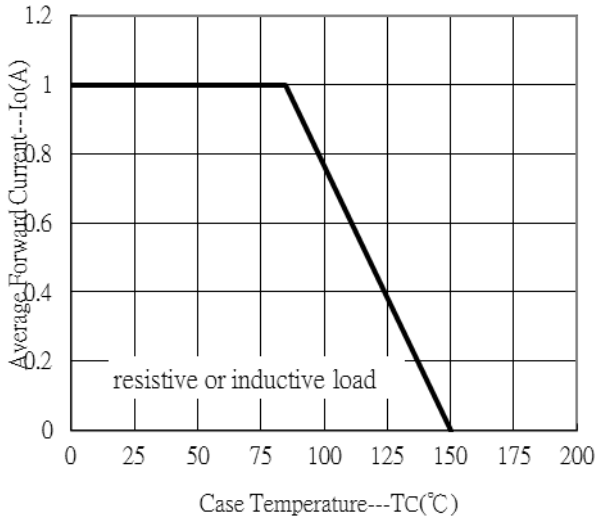


Maximum Drain Current vs Junction Temperature

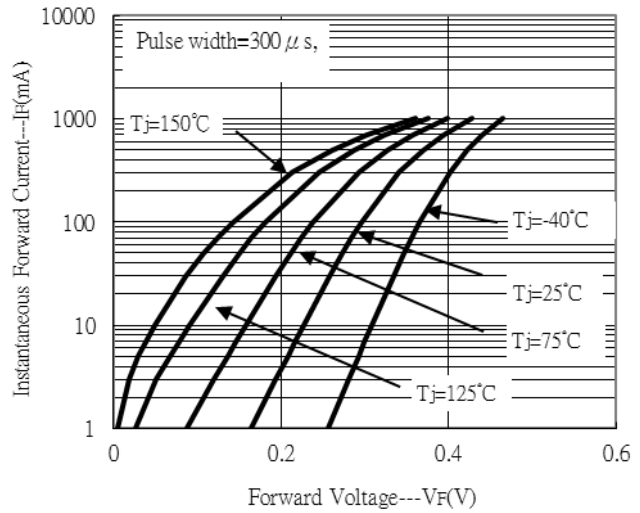


Schottky Diode Typical Characteristics

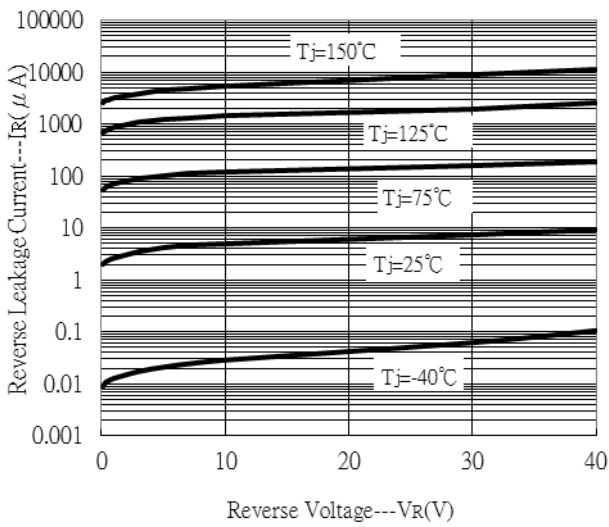
Forward Current Derating Curve



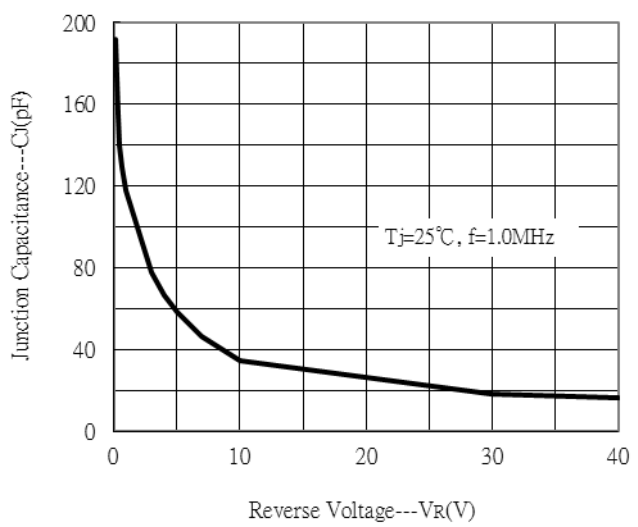
Forward Current vs Forward Voltage



Reverse Leakage Current vs Reverse Voltage

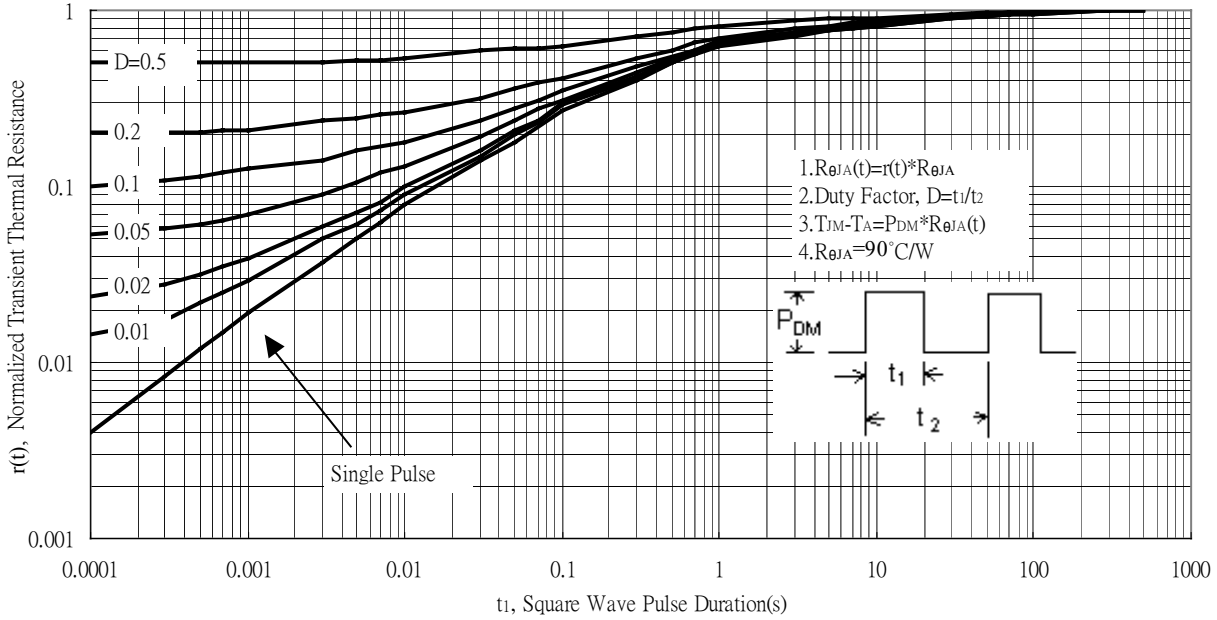


Junction Capacitance vs Reverse Voltage

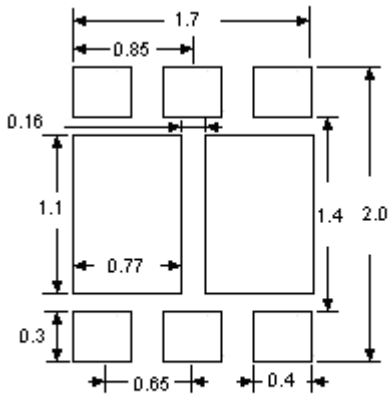


Thermal Characteristics

Transient Thermal Response Curves

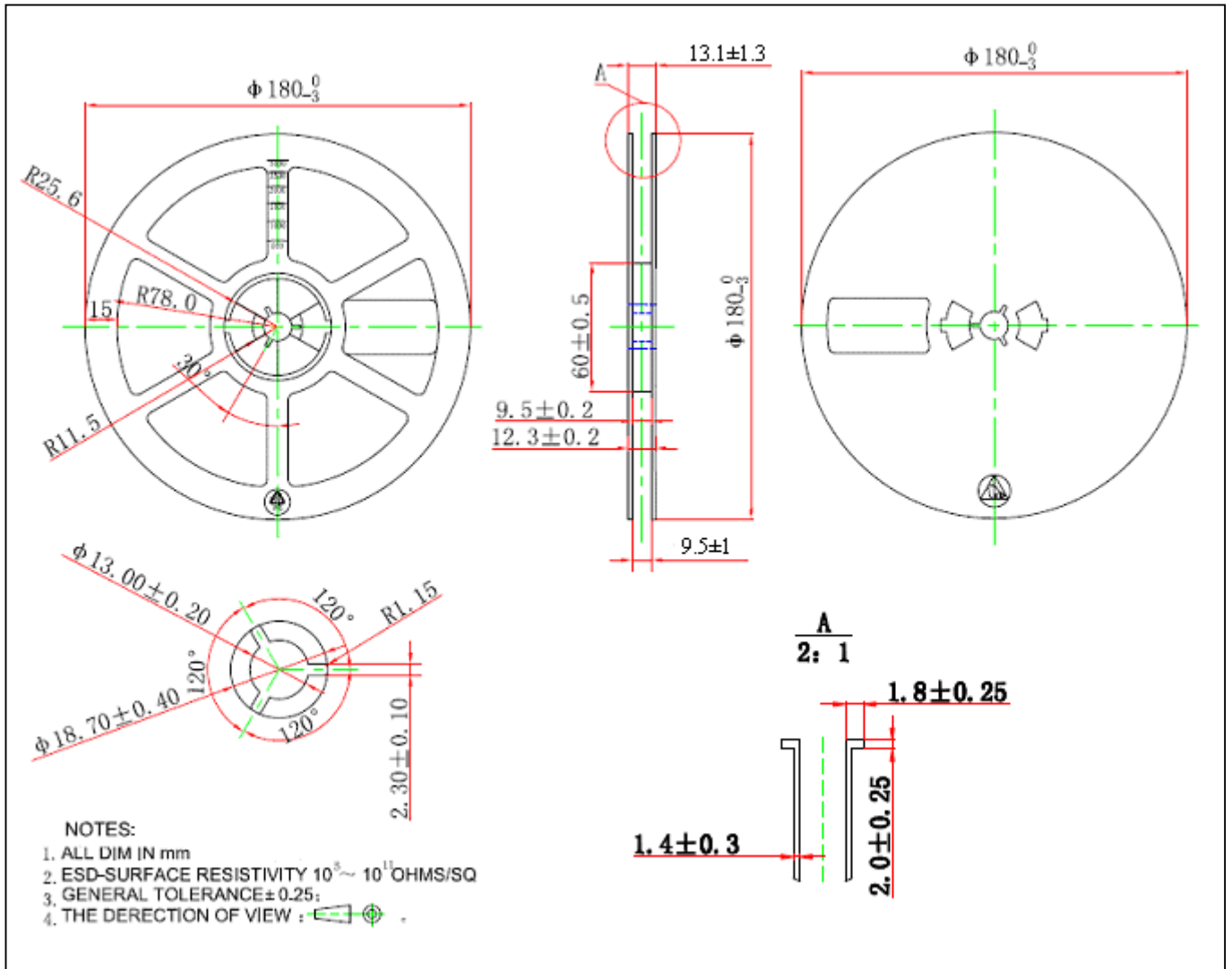


Recommended Soldering Footprint

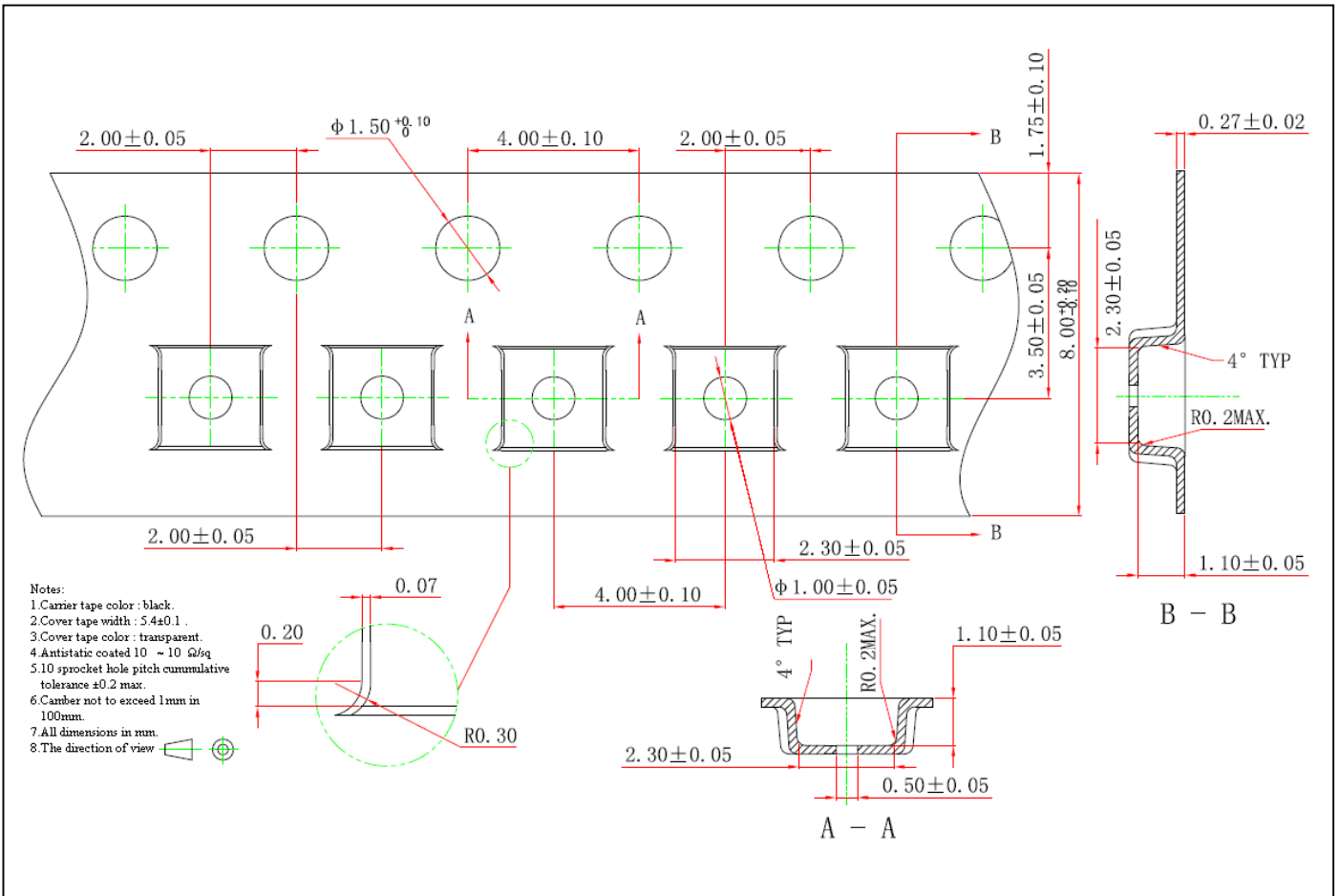


Unit : mm

Reel Dimension



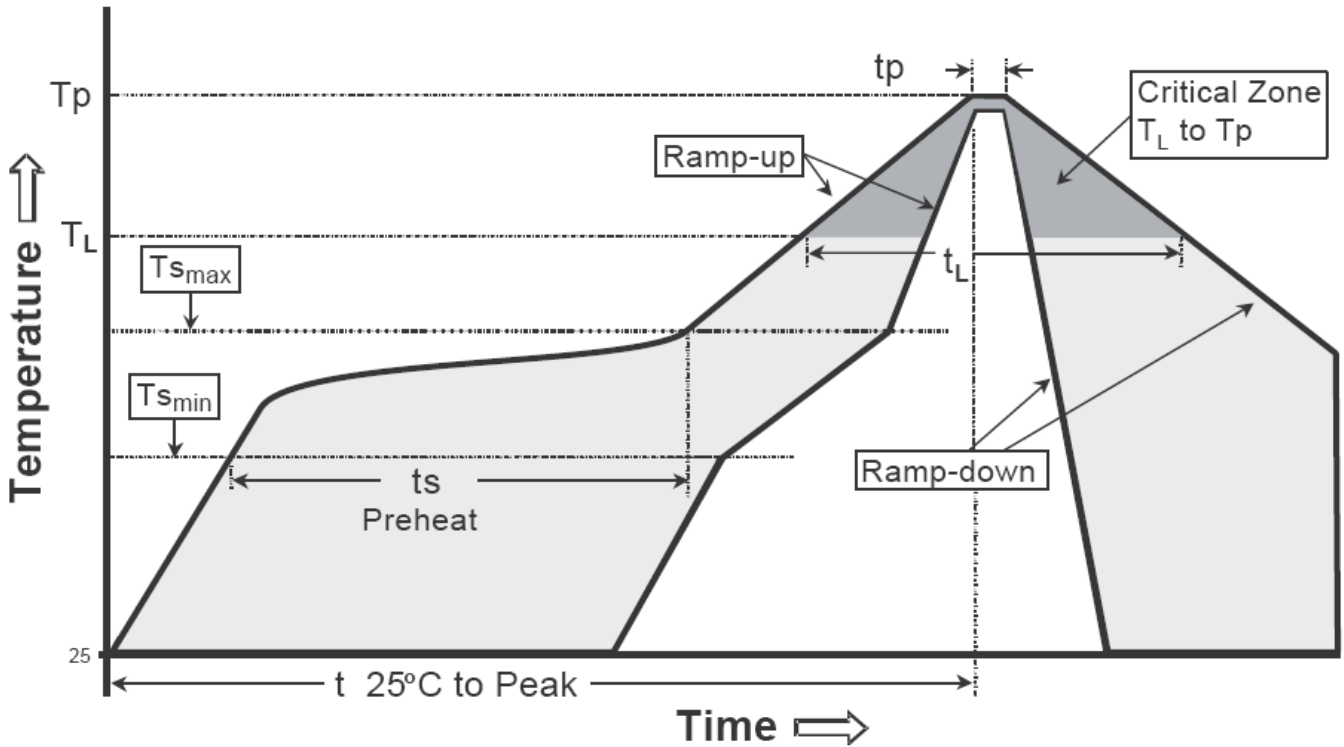
Carrier Tape Dimension



Recommended wave soldering condition

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

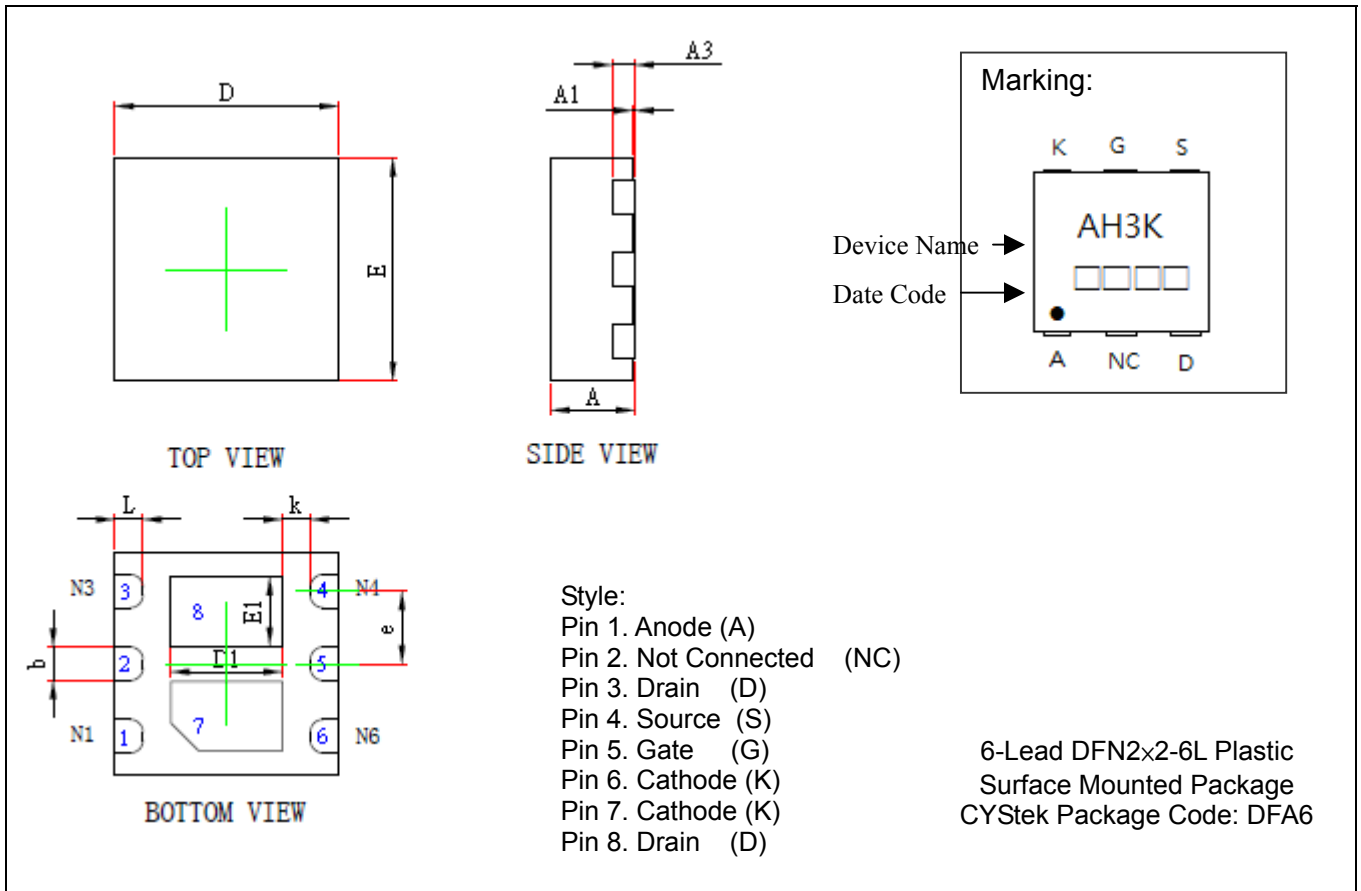
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	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.

DFN2x2-6L Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031	E1	0.520	0.720	0.020	0.028
A1	0.000	0.050	0.000	0.002	k	0.200	-	0.008	-
A3	0.203	REF	0.008	REF	b	0.250	0.350	0.010	0.014
D	1.900	2.100	0.075	0.083	e	0.650 TYP		0.026 TYP	
E	1.900	2.100	0.075	0.083	L	0.200	0.300	0.008	0.012
D1	0.900	1.100	0.035	0.043					

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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