

N-Channel MOSFET (dual transistors)

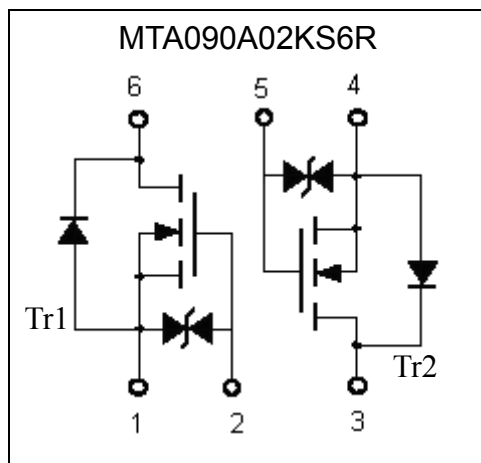
MTA090A02KS6R

Features

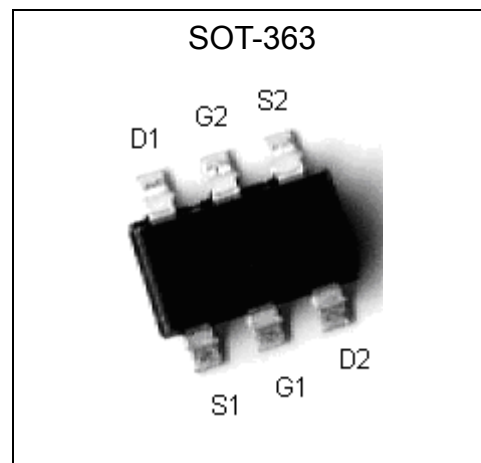
- Low on-resistance
- ESD protected gate
- High speed switching
- Low-voltage drive
- Easily designed drive circuits
- Easy to use in parallel
- Pb-free lead plating and halogen-free package

BV_{DSS}		20V
$I_D@V_{GS}=4.5V, T_C=25^\circ C$		2.8A
$I_D@V_{GS}=4.5V, T_A=25^\circ C$		1.8A
$R_{DS(on)(TYP)}$	$V_{GS}=4.5V, I_D=1A$	85m Ω
	$V_{GS}=2.5V, I_D=1A$	110m Ω
	$V_{GS}=1.8V, I_D=0.5A$	160m Ω

Equivalent Circuit

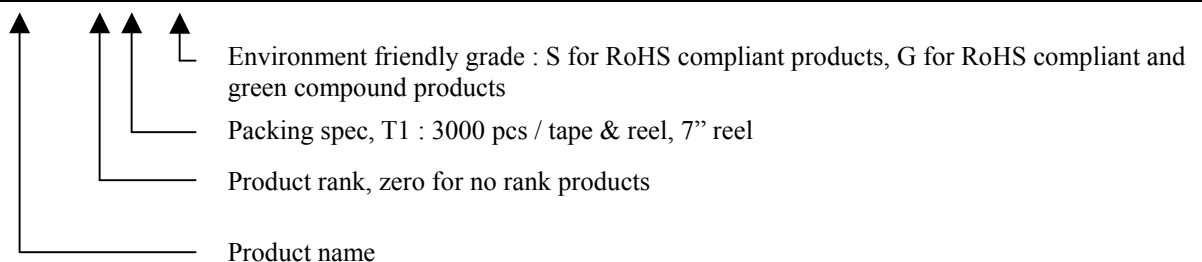


Outline



Ordering Information

Device	Package	Shipping
MTA090A02K6R-0-T1-G	SOT-363 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel





The following characteristics apply to both Tr1 and Tr2

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	V _{DSS}	20	V	
Gate-Source Voltage	V _{GSS}	±8		
Continuous Drain Current	I _D	V _{GS} =4.5V, T _A =25°C	1.8 (Note 1)	A
		V _{GS} =4.5V, T _A =70°C	1.4 (Note 1)	
		V _{GS} =4.5V, T _C =25°C	2.8	
		V _{GS} =4.5V, T _C =70°C	2.2	
Pulsed Drain Current	I _{DM}	8 (Note 2)		
Continuous Source-Drain Diode Current	I _S	T _A =25°C	0.61 (Note 1)	
		T _C =25°C	1	
Power Dissipation	P _D	T _A =25°C	0.74 (Note 1)	W
		T _A =70°C	0.47 (Note 1)	
		T _C =25°C	1.25	
		T _C =70°C	0.8	
Operating Junction and Storage Temperature Range	T _j ; T _{stg}	-55~+150	°C	

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{θJC}	100	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 1)	R _{θJA}	170	

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec. 220°C/W under steady state.
 2.Pulse width limited by maximum junction temperature.

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS} *	20	-	-	V	V _{GS} =0V, I _D =10μA
V _{GS(th)}	0.3	-	1		V _{DS} =V _{GS} , I _D =250μA
I _{GSS}	-	-	±10	μA	V _{GS} =±8V, V _{DS} =0V
I _{DSS}	-	-	1		V _{DS} =20V, V _{GS} =0V
	-	-	10		V _{DS} =20V, V _{GS} =0V, T _J =55°C
R _{DS(ON)} *	-	85	145	mΩ	V _{GS} =4.5V, I _D =1A
	-	110	180		V _{GS} =2.5V, I _D =1A
	-	160	255		V _{GS} =1.8V I _D =0.5A,
G _{FS}	-	3.5	-	S	V _{DS} =4V, I _D =1.5A
Dynamic					
C _{iss}	-	157	236	pF	V _{DS} =10V, V _{GS} =0V, f=1MHz
C _{oss}	-	34	-		
C _{rss}	-	29	-		

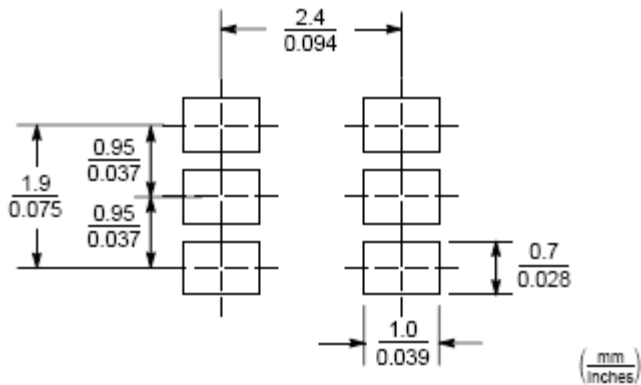
$t_d(ON)$	-	4	6	ns	$V_{DS}=10V, I_D=1.2A, V_{GS}=4.5V, R_G=1\Omega$
t_r	-	18.4	28		
$t_d(OFF)$	-	14.6	22		
t_f	-	5.2	8		
$t_d(ON)$	-	2.4	4		
t_r	-	18.8	28		
$t_d(OFF)$	-	13.2	20		
t_f	-	3.6	6	nC	$V_{DS}=10V, I_D=1.5A, V_{GS}=4.5V$
Q_g	-	2.5	3.8		
Q_{gs}	-	0.57	-		
Q_{gd}	-	0.53	-		

Source-Drain Diode

$*I_S$	-	-	1	A	$T_C=25^\circ C$
$*I_{SM}$	-	-	4		
$*V_{SD}$	-	0.86	1.2	V	$I_S=1.2A, V_{GS}=0V$
$*t_{rr}$	-	4.1	-	ns	$I_F=1.2A, V_{GS}=0V, dI_F/dt=100A/\mu s$
Q_{rr}	-	1.0	-	nC	
t_a	-	3	-	ns	
t_b	-	1.1	-		

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

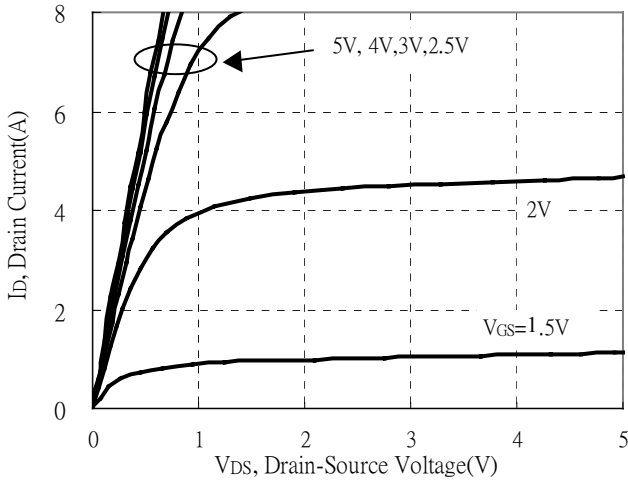
Recommended Soldering Footprint



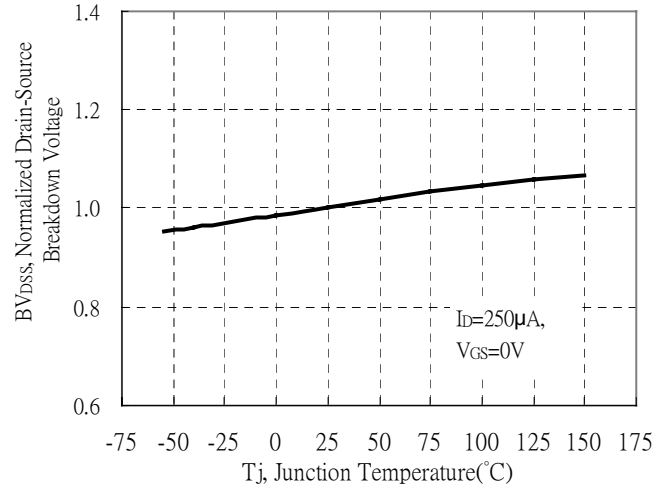


Typical Characteristics

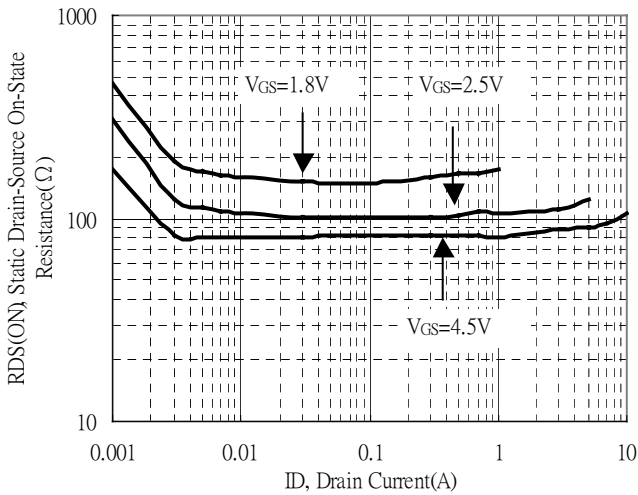
Typical Output Characteristics



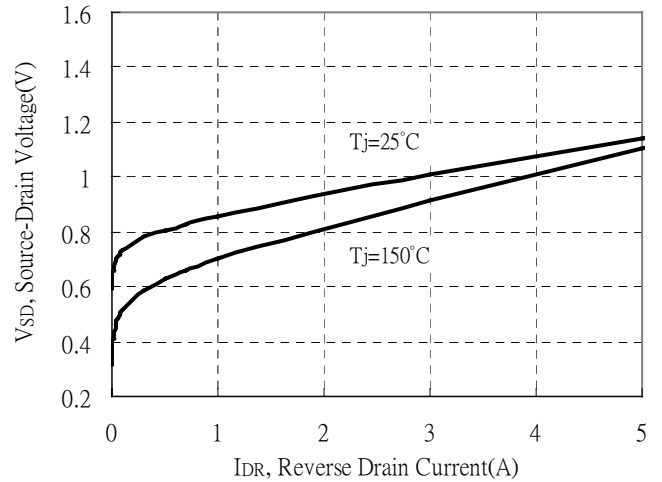
Brekdown Voltage vs Ambient Temperature



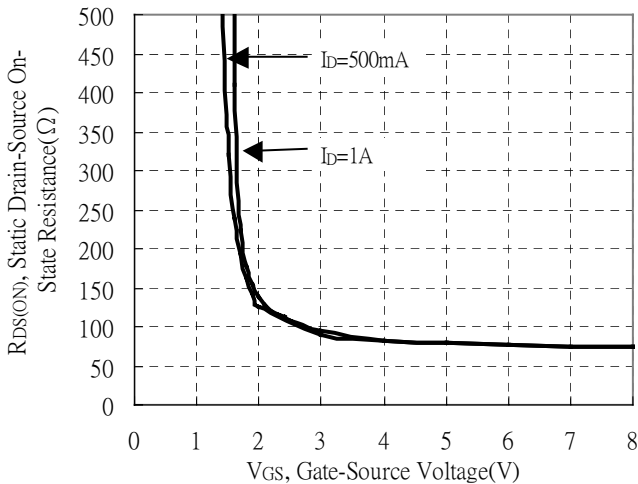
Static Drain-Source On-State resistance vs Drain Current



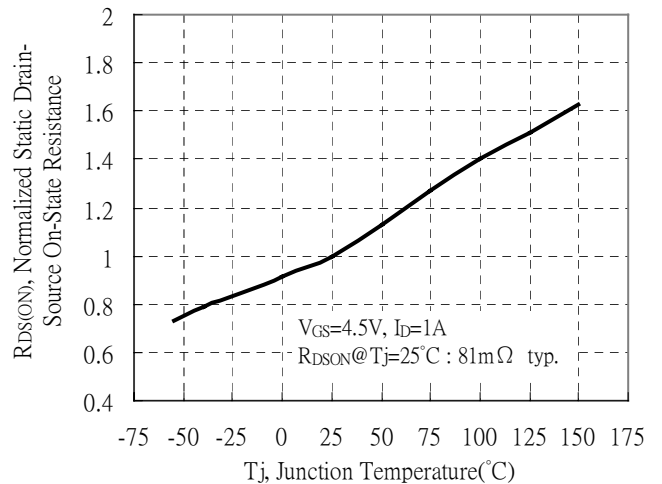
Reverse Drain Current vs Source-Drain Voltage



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

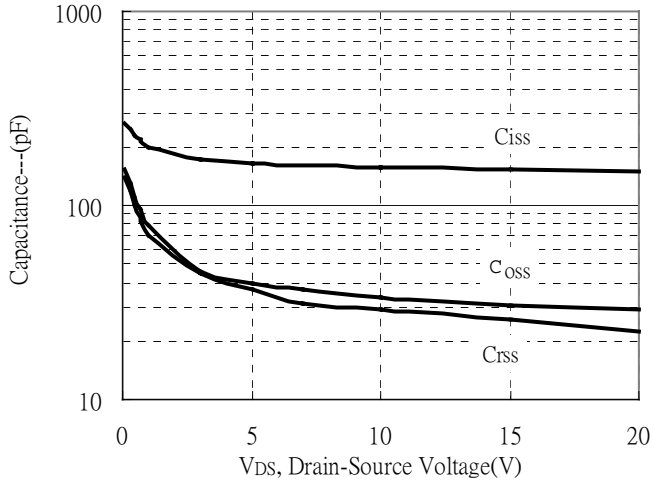


Drain-Source On-State Resistance vs Junction Temperature

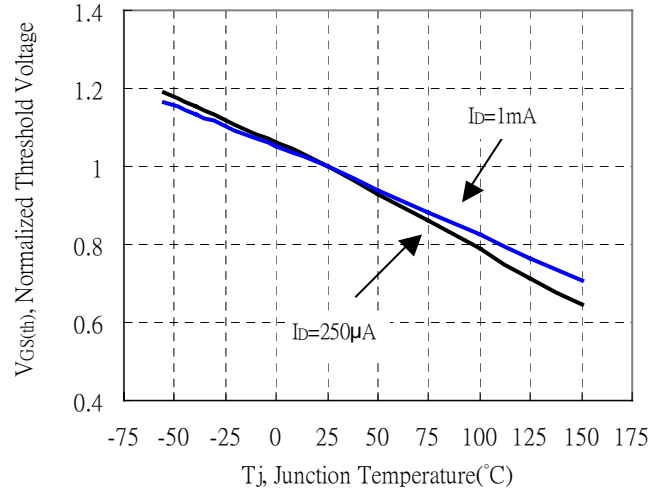


Typical Characteristics (Cont.)

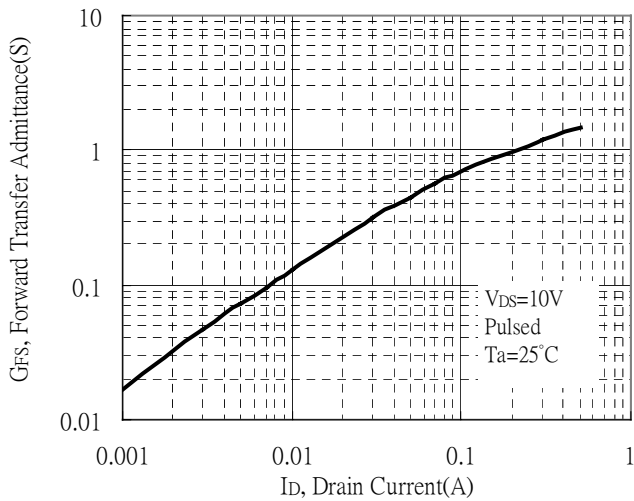
Capacitance vs Drain-to-Source Voltage



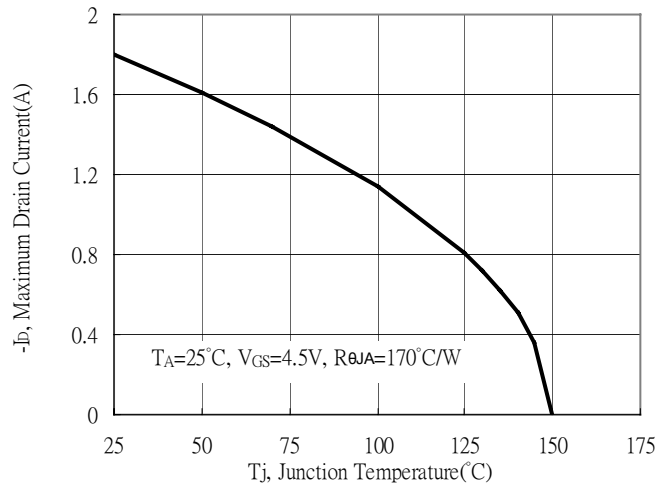
Threshold Voltage vs Junction Temperature



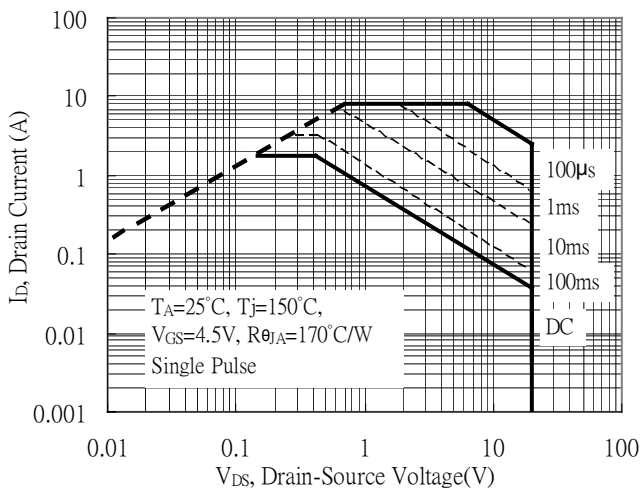
Forward Transfer Admittance vs Drain Current



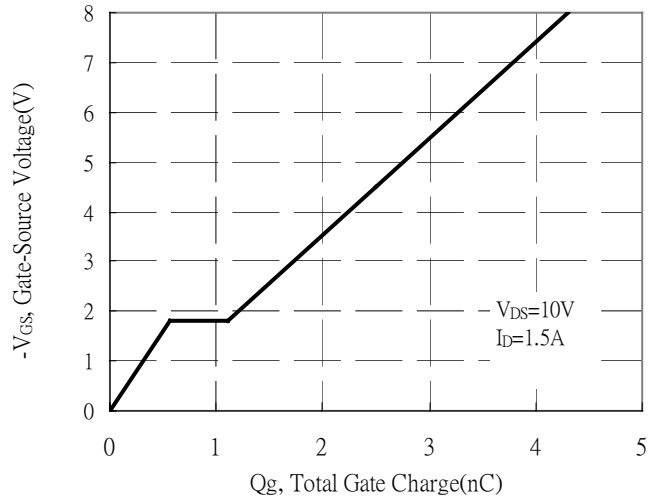
Maximum Drain Current vs Junction Temperature



Maximum Safe Operating Area

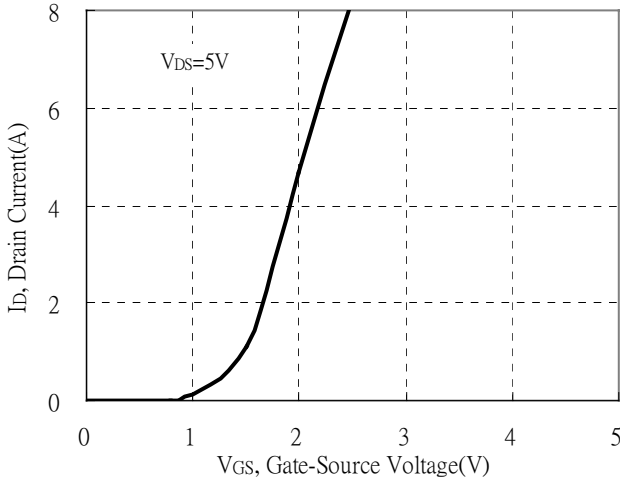


Gate Charge Characteristics

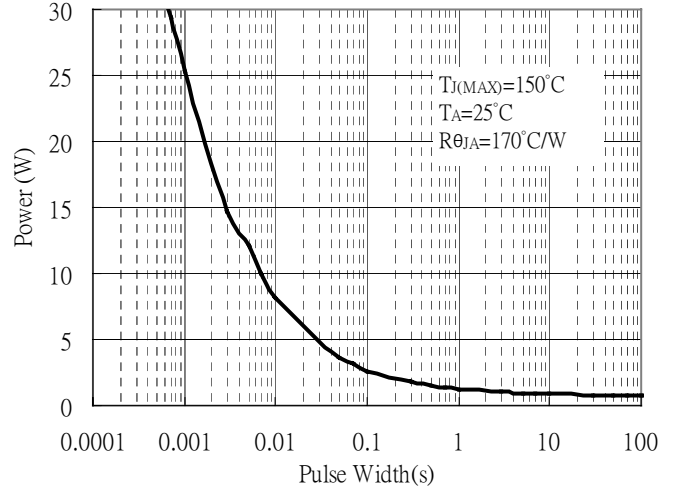


Typical Characteristics (Cont.)

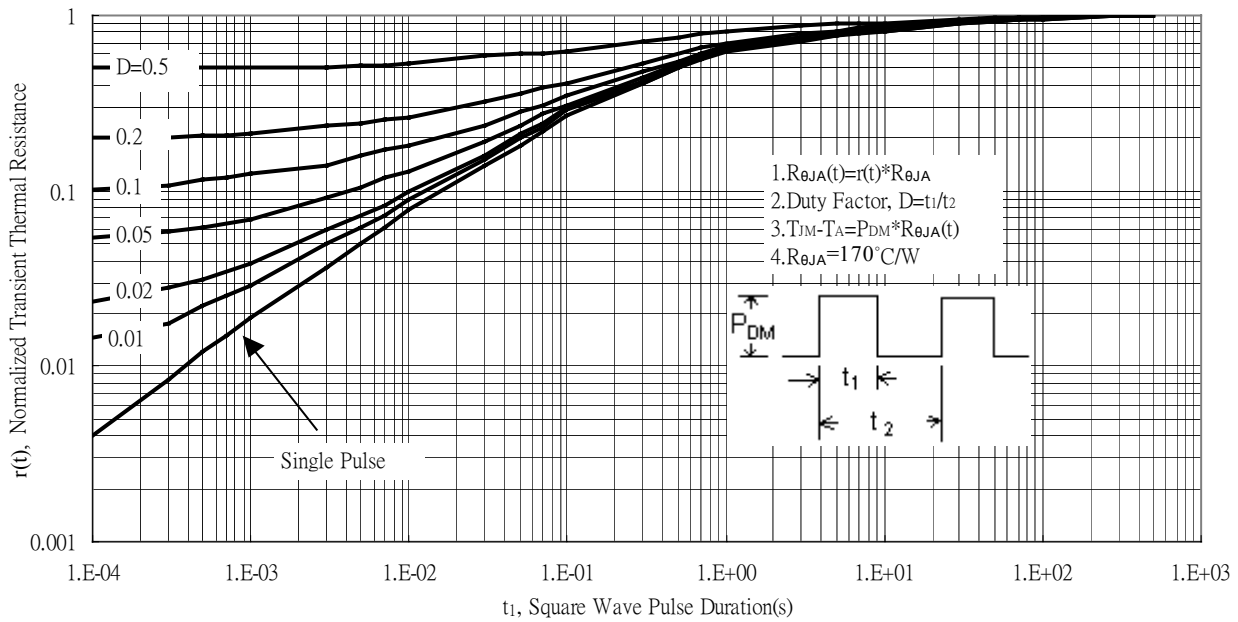
Typical Transfer Characteristics



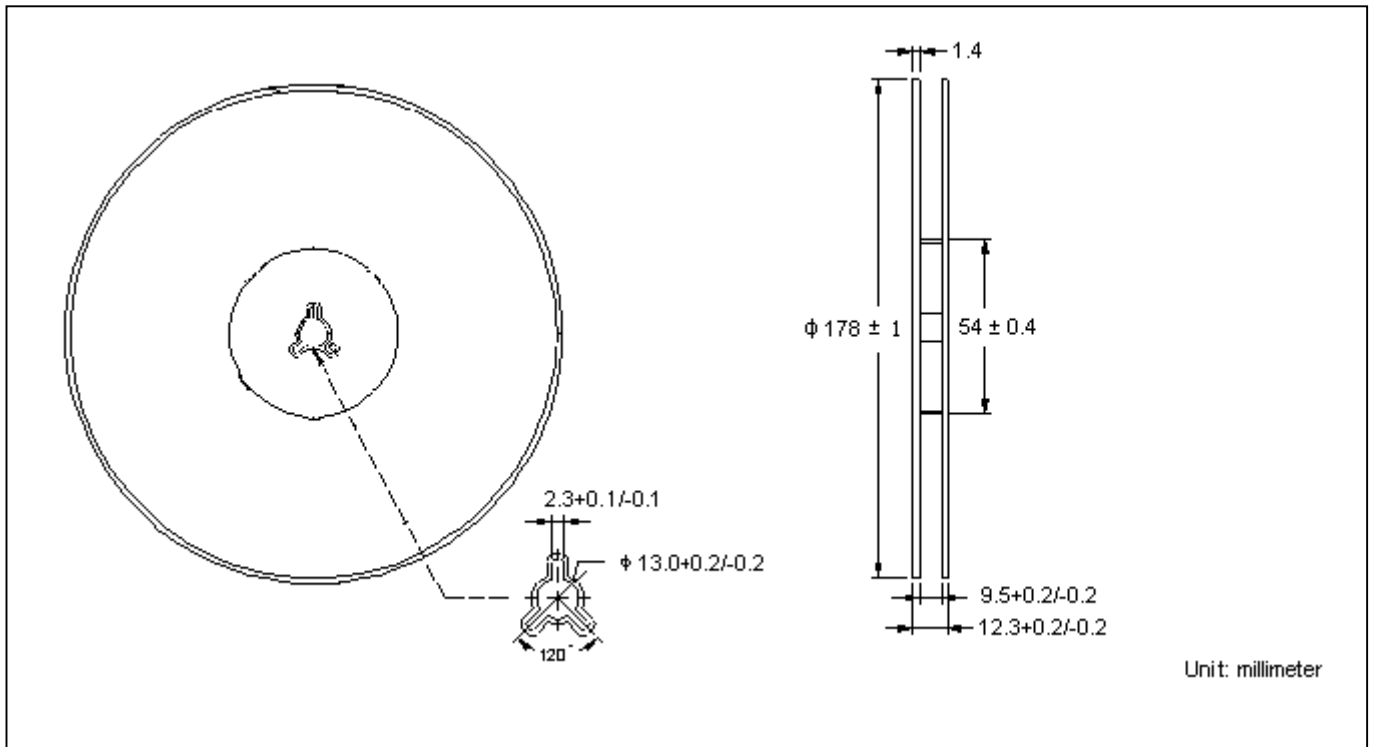
Single Pulse Power Rating, Junction to Ambient



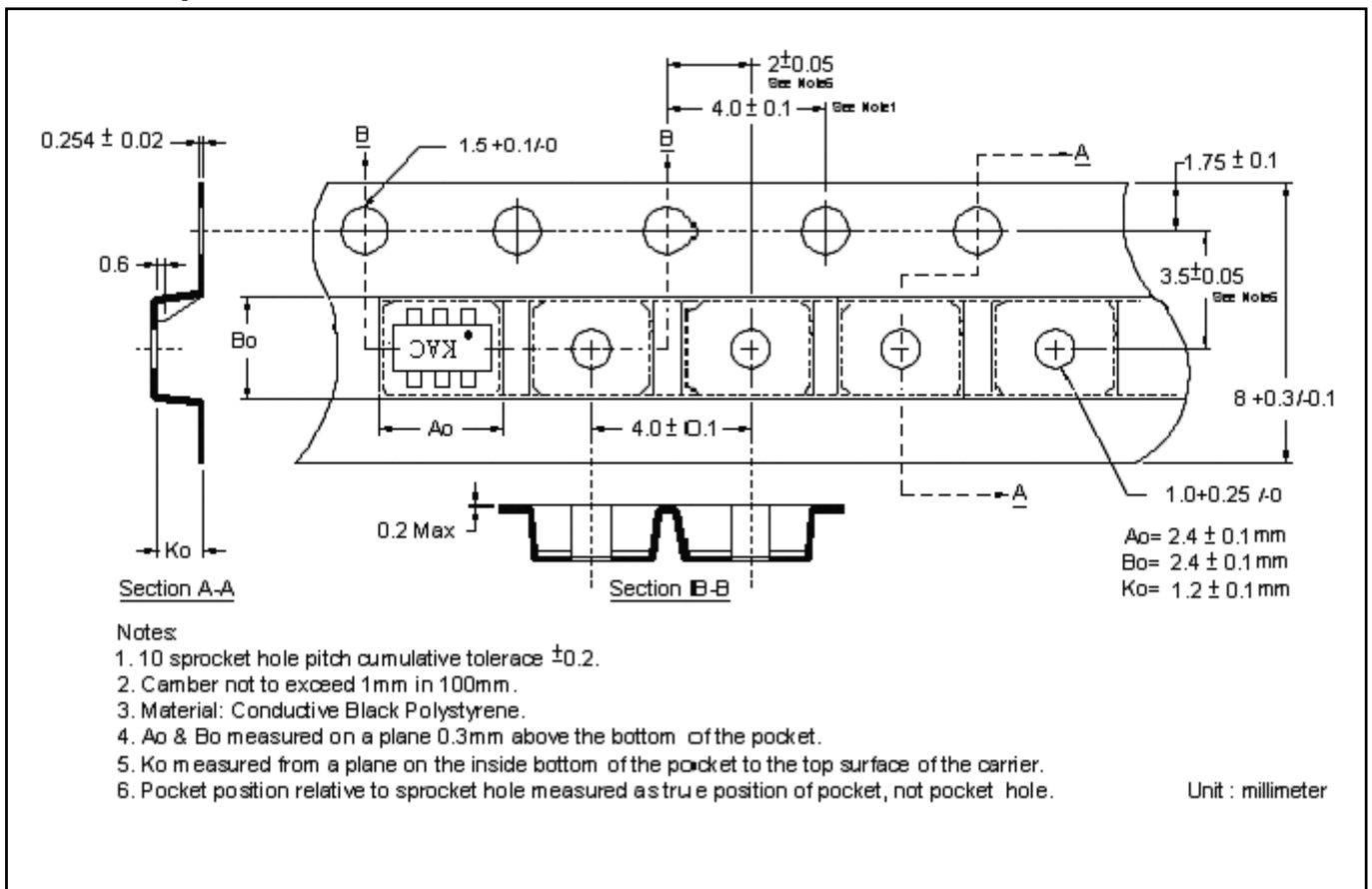
Transient Thermal Response Curves



Reel Dimension



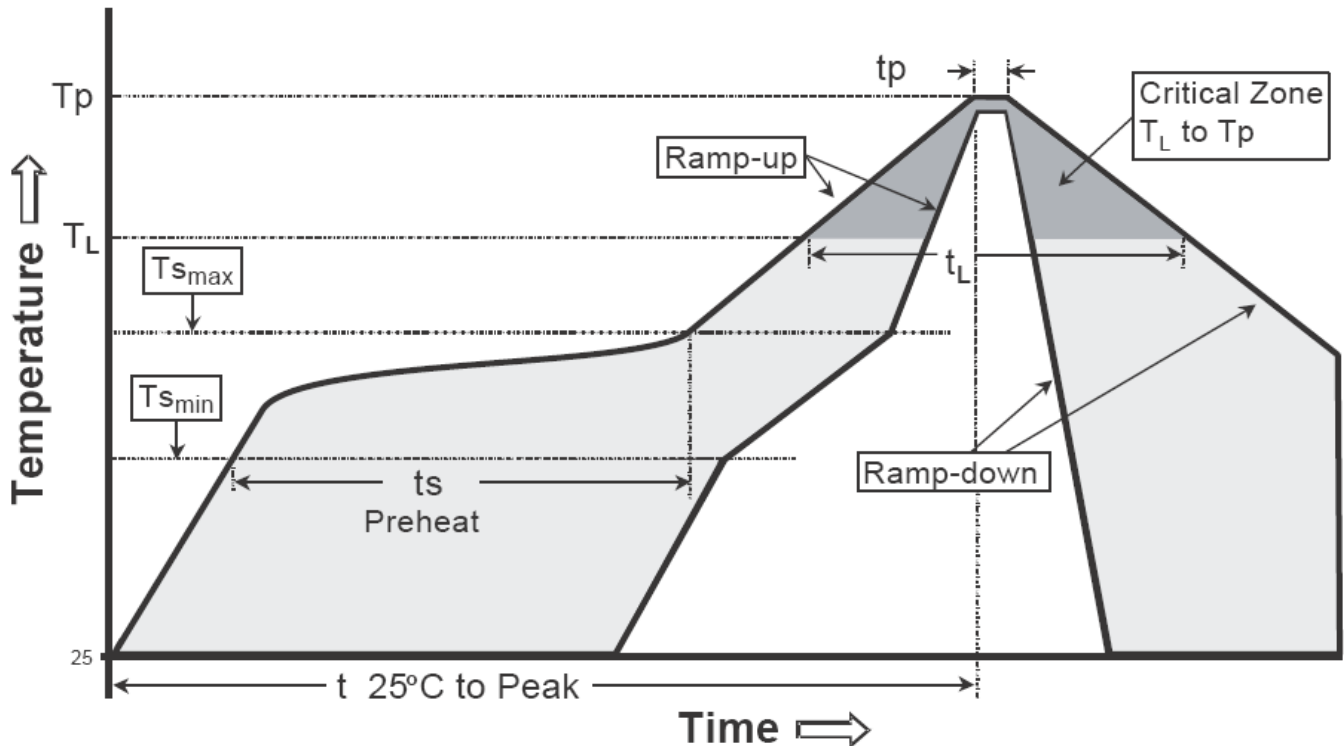
Carrier Tape Dimension



Recommended wave soldering condition

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

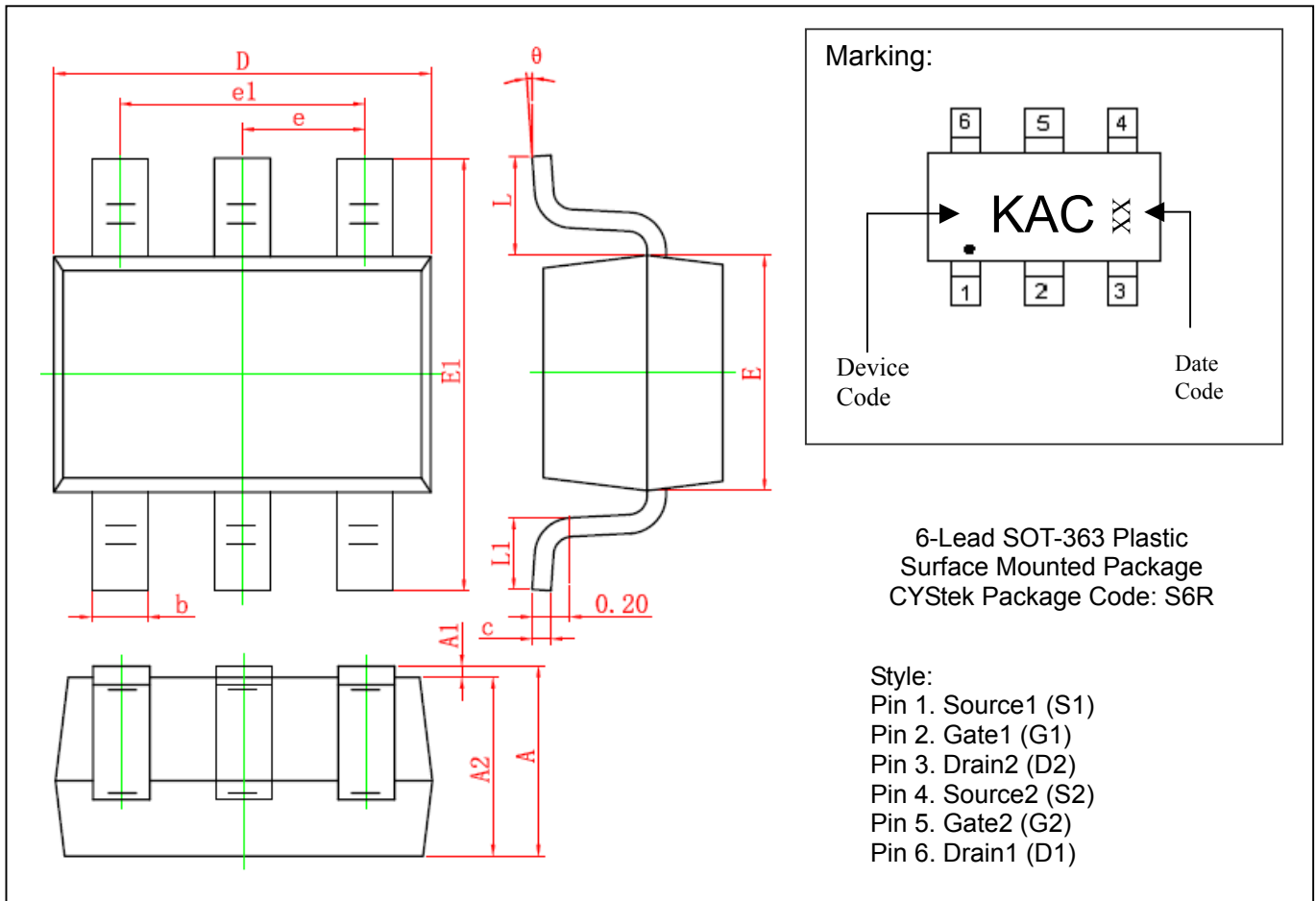
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmmax 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 :1. All temperatures refer to topside of the package, measured on the package body surface.
 2.For devices mounted on FR-4 PCB of 1.6mm or equivalent grade PCB. If other grade PCB is used, care should be taken to match the coefficients of thermal expansion between components and PCB. If they are not matched well, the solder joints may crack or the bodies of the parts may crack or shatter as the assembly cools.

SOT-363 Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043	E1	2.150	2.450	0.085	0.096
A1	0.000	0.100	0.000	0.004	e	0.650 TYP		0.026 TYP	
A2	0.900	1.000	0.035	0.039	e1	1.200	1.400	0.047	0.055
b	0.150	0.350	0.006	0.014	L	0.525 REF		0.021 REF	
c	0.080	0.150	0.003	0.006	L1	0.260	0.460	0.010	0.018
D	2.000	2.200	0.079	0.087	θ	0°	8°	0°	8°
E	1.150	1.350	0.045	0.053					

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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.