N & P-Channel Enhancement Mode Power MOSFET

MTC3504BJ4

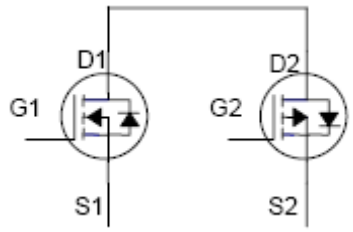
	N-CH	P-CH
BV_{DSS}	40V	-40V
I_D	12A	-9A
$R_{DSON(MAX)}$	35mΩ	44mΩ

Features

- Low Gate Charge
- Simple Drive Requirement
- RoHS compliant & Halogen-free package

Equivalent Circuit

MTC3504BJ4

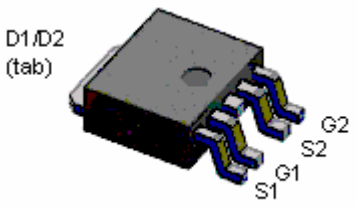


G：Gate D：Drain

S：Source

Outline

TO-252-4L



Absolute Maximum Ratings (Tc=25°C, unless otherwise noted)

Parameter	Symbol	Limits		Unit
		N-channel	P-channel	
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	±20	±20	
Continuous Drain Current @ Tc=25°C	I_D	12	-9	A
Continuous Drain Current @ Tc=100°C	I_D	8	-6	
Pulsed Drain Current *1	I_{DM}	48	-36	
Total Power Dissipation (Tc=25℃)	Pd	25		W
Total Power Dissipation (Tc=100℃)		18		
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+175		°C

Note : *1. Pulse width limited by maximum junction temperature
*2. Duty cycle ≤ 1%

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	6	°C/W
Thermal Resistance, Junction-to-ambient, max * 1	$R_{th,j-a}$	42	°C/W

Note : *1 62.5°C/W when mounted on a 1 in^2 pad of 2 oz copper.

N-CH Characteristics (Tc=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	40	-	-	V	V_{GS}=0, I_D=250μA
$V_{GS(th)}$	1.8	2.3	3.2	V	V_{DS} =V_{GS}, I_D=250μA
G_{FS} *1	-	19	-	S	V_{DS} =5V, I_D=10A
I_{GSS}	-	-	±100	nA	V_{GS}=±20, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS} =32V, V_{GS} =0
	-	-	25	μA	V_{DS} =30V, V_{GS} =0, Tj=125°C
$I_{D(ON)}$ *1	12	-	-	A	V_{DS} =5V, V_{GS} =10V
$R_{DS(ON)}$ *1	-	30	35	mΩ	V_{GS} =10V, I_D=10A
	-	40	50	mΩ	V_{GS} =7V, I_D=8A
Dynamic					
Qg *1	-	9.1	-	nC	I_D=15A, V_{DS}=20V, V_{GS}=10V
Qgs *1	-	2.3	-		
Qgd *1	-	3	-		
$t_{d(ON)}$ *1	-	2.5	-	ns	V_{DS}=10V, I_D=1A, V_{GS}=10V, R_G=6Ω
tr *1	-	7.5	-		
$t_{d(OFF)}$ *1	-	12	-		
t_f *1	-	4	-		
Ciss	-	796	-	pF	V_{GS}=0V, V_{DS}=20V, f=1MHz
Coss	-	84	-		
Crss	-	59	-		
Source-Drain Diode					
I_S *1	-	-	12	A	
I_{SM} *2	-	-	48		
V_{SD} *1	-	-	1.3	V	I_F=I_S, V_{GS}=0V

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

*2.Pulse width limited by maximum junction temperature.

P-CH Characteristics (Tc=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-40	-	-	V	V_{GS}=0, I_D=-250μA
$V_{GS(th)}$	-1.8	-2.3	-3.2	V	V_{DS} =V_{GS}, I_D=-250μA
G_{FS} *1	-	11	-	S	V_{DS} =-5V, I_D=-8A
I_{GSS}	-	-	±100	nA	V_{GS}=±20, V_{DS}=0
I_{DSS}	-	-	-1	μA	V_{DS} =-32V, V_{GS} =0
	-	-	-25	μA	V_{DS} =-30V, V_{GS} =0, Tj=125°C
$I_{D(ON)}$ *1	-9	-	-	A	V_{DS} =-5V, V_{GS} =-10V
$R_{DS(ON)}$ *1	-	38	44	mΩ	V_{GS} =-10V, I_D=-8A
	-	50	70	mΩ	V_{GS} =-7V, I_D=-6A
Dynamic					
Qg *1	-	11.5	-	nC	I_D=-10A, V_{DS}=-20V, V_{GS}=-10V
Qgs *1	-	2.5	-		
Qgd *1	-	3.2	-		
$t_{d(ON)}$ *1	-	7	-	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-10V, R_G=6Ω
tr *1	-	10	-		
$t_{d(OFF)}$ *1	-	20	-		
t_f *1	-	12	-		
Ciss	-	1223	-	pF	V_{GS}=0V, V_{DS}=-20V, f=1MHz
Coss	-	405	-		
Crss	-	366	-		
Source-Drain Diode					
I_S *1	-	-	-9	A	
I_{SM} *2	-	-	-36		
V_{SD} *1	-	-	-1.3	V	I_F=I_S, V_{GS}=0V

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

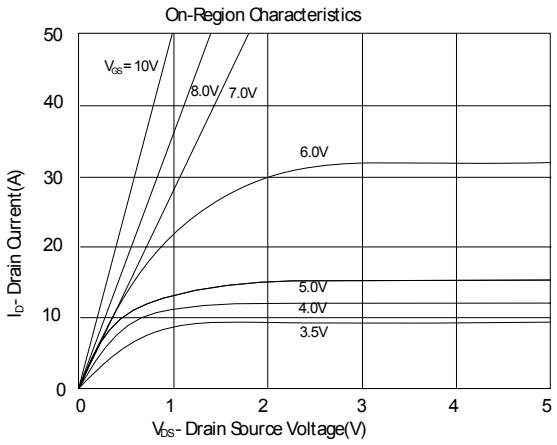
*2.Pulse width limited by maximum junction temperature.

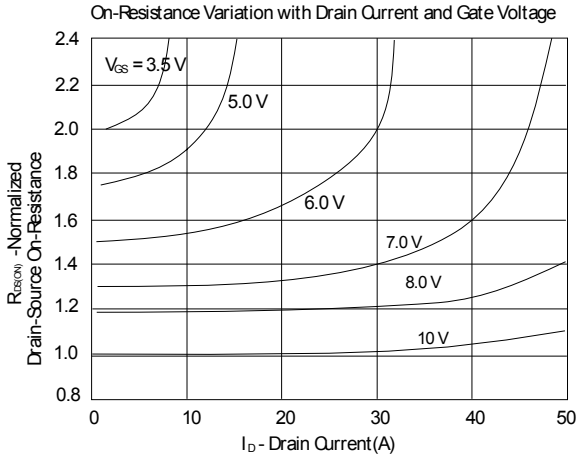
Ordering Information

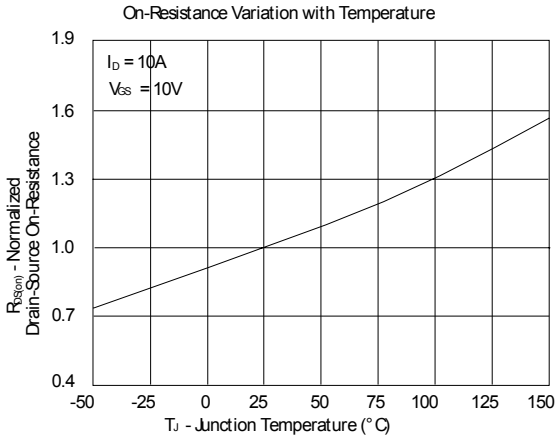
Device	Package	Shipping	Marking
MTC3504BJ4	TO-252 (RoHS compliant & Halogen-free package)	2500 pcs / Tape & Reel	3504

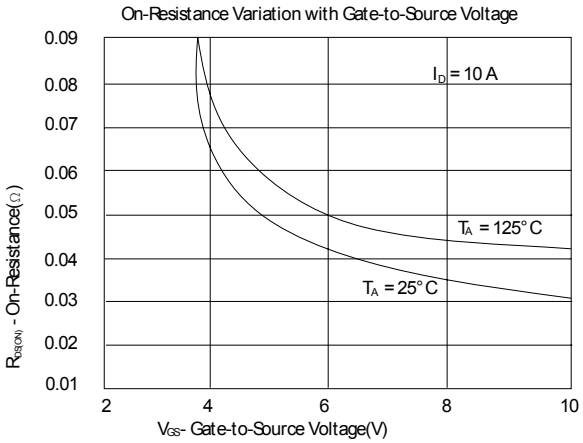
Characteristic Curves

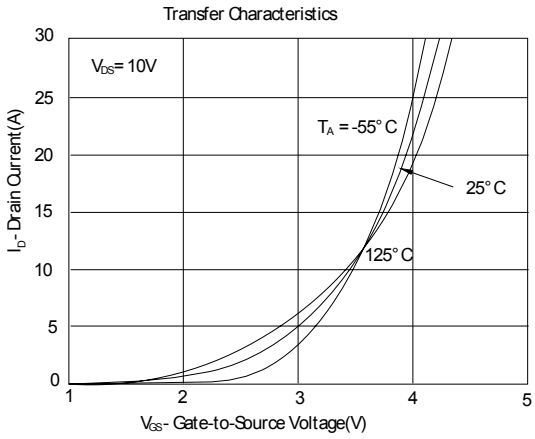
N-Channel

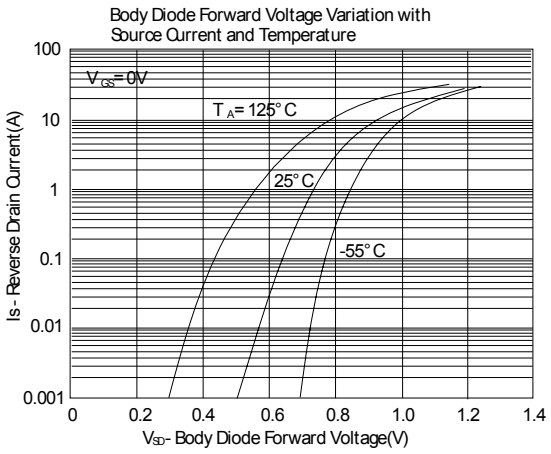






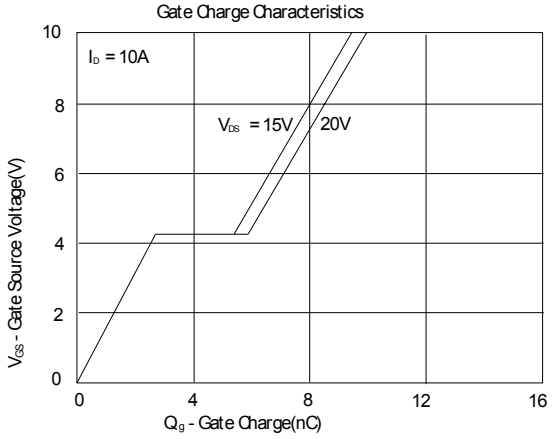




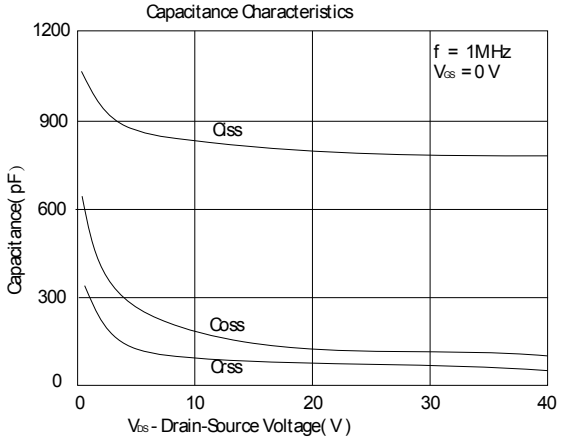


Characteristic Curves(Cont.)

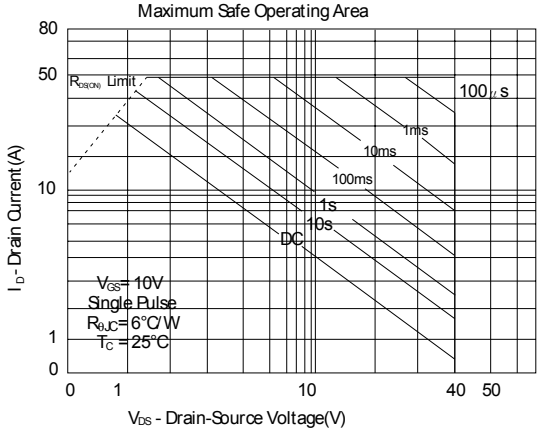
Gate Charge Characteristics



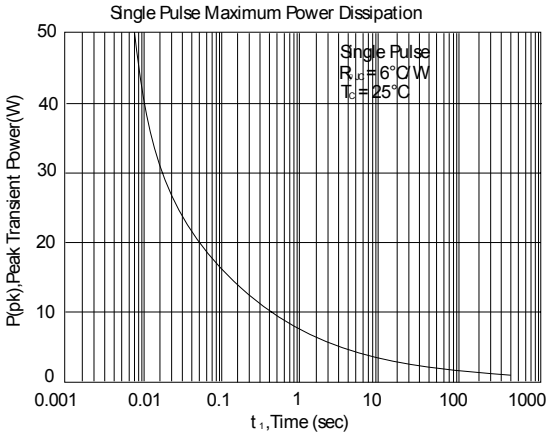
Capacitance Characteristics



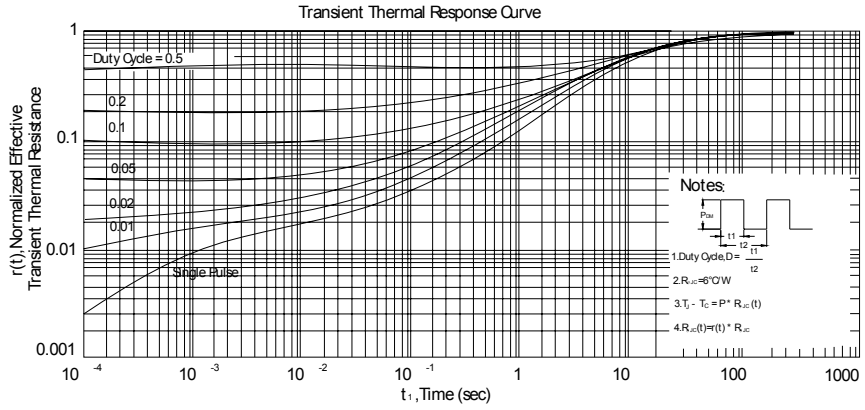
Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation

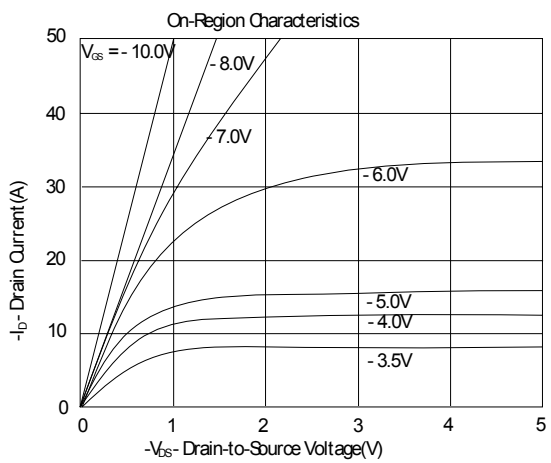


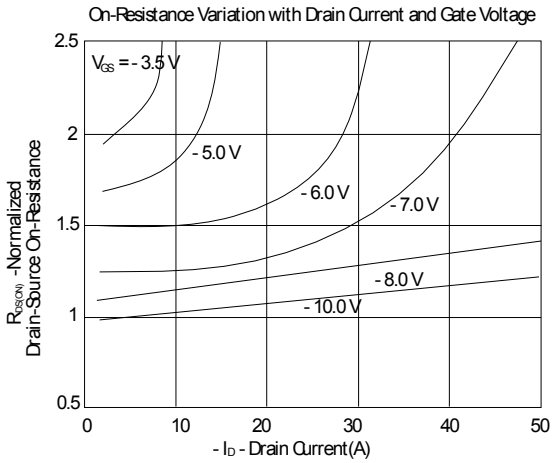
Transient Thermal Response Curve

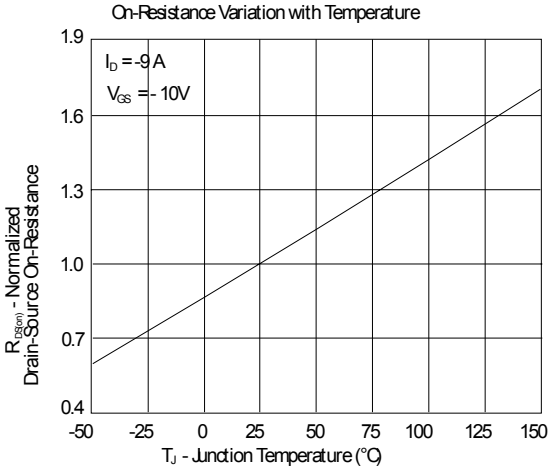


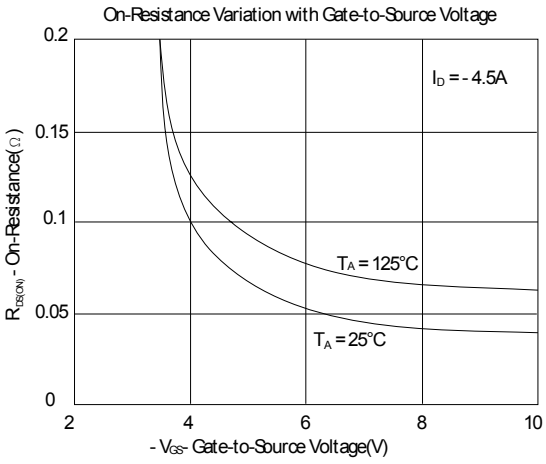
Characteristic Curves(Cont.)

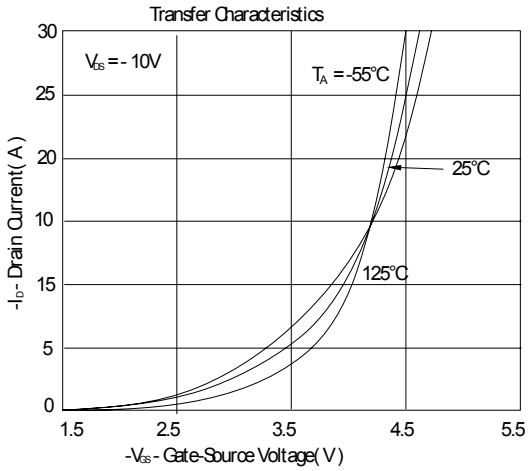
P-Channel

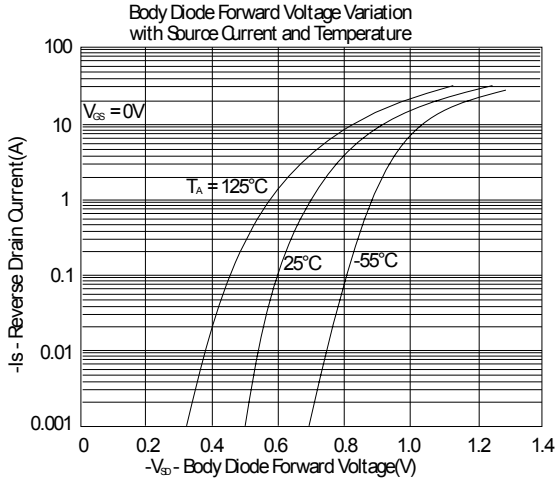






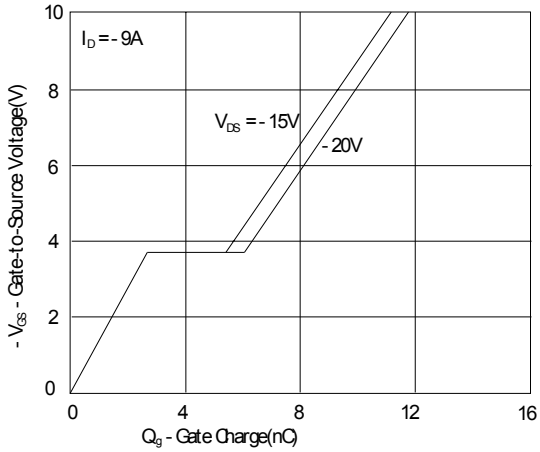




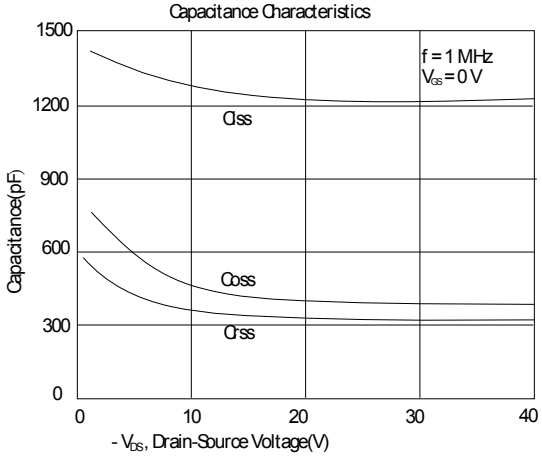


Characteristic Curves(Cont.)

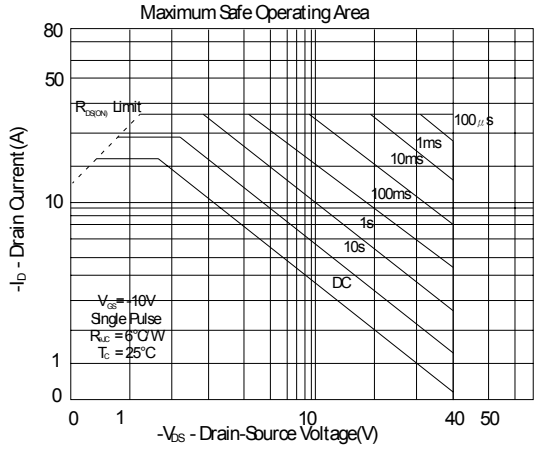
Gate Charge Characteristics



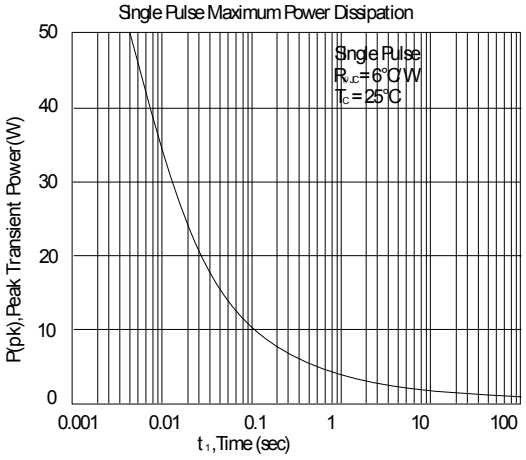
Capacitance Characteristics



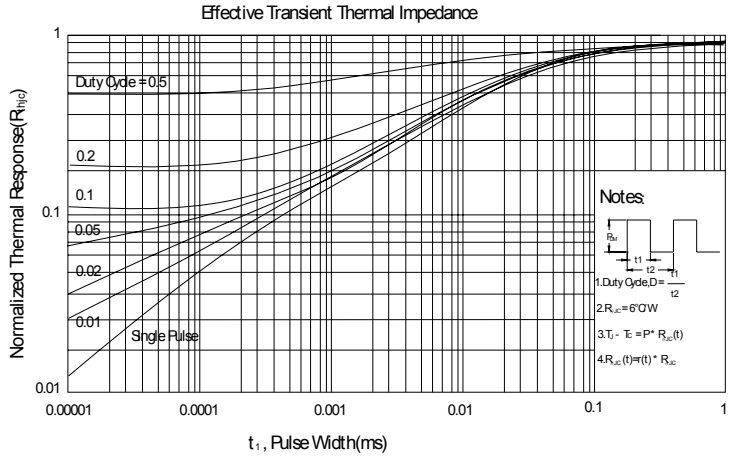
Maximum Safe Operating Area



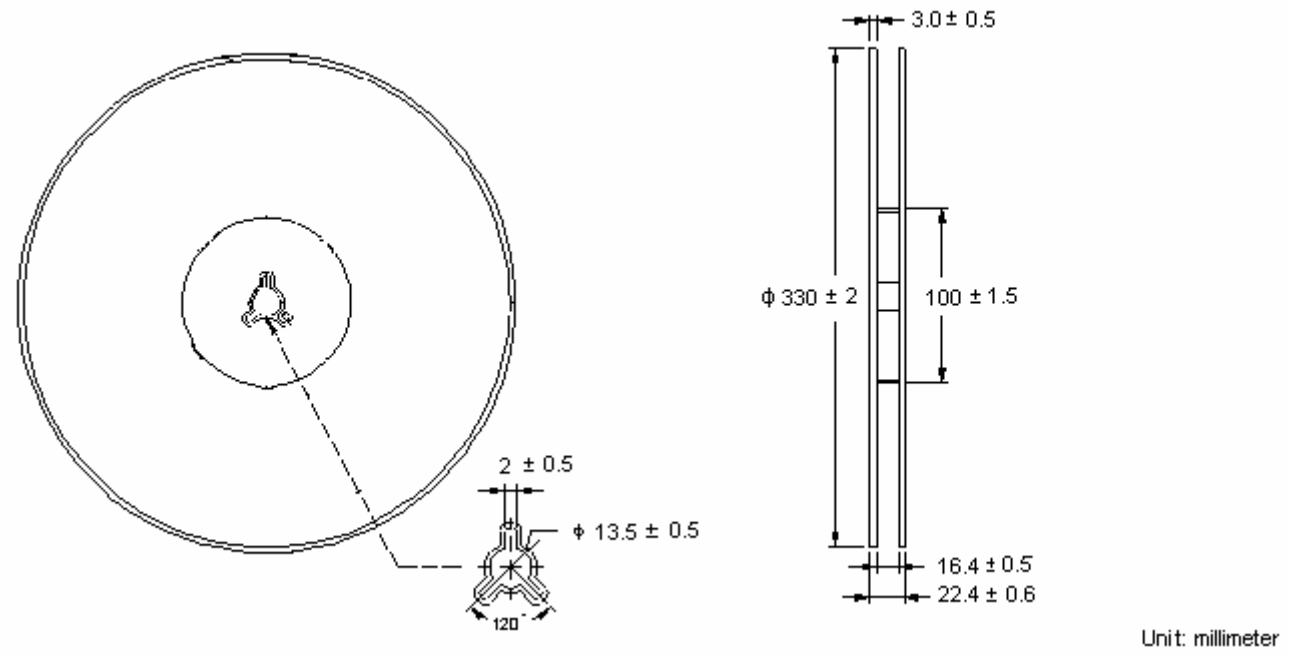
Single Pulse Maximum Power Dissipation



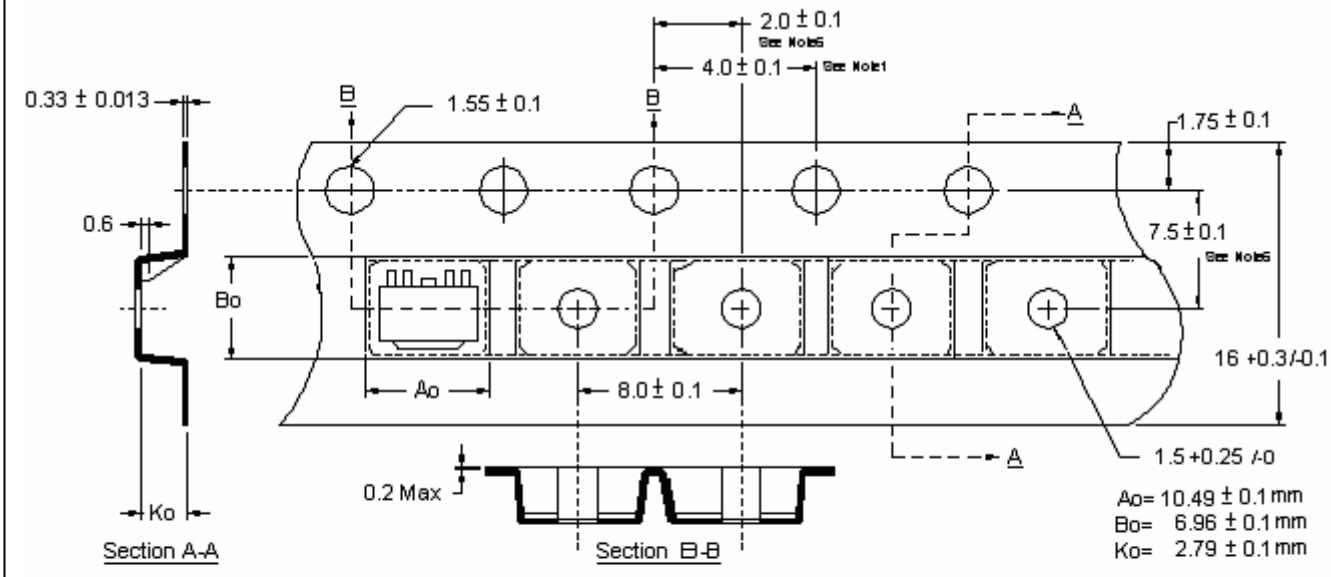
Effective Transient Thermal Impedance



Reel Dimension



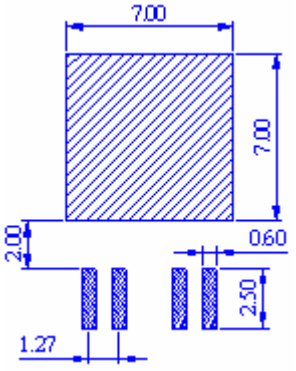
Carrier Tape Dimension



Notes:
1. 10 sprocket hole pitch cumulative tolerace ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: Conductive Black Advantek 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 soldering footprint

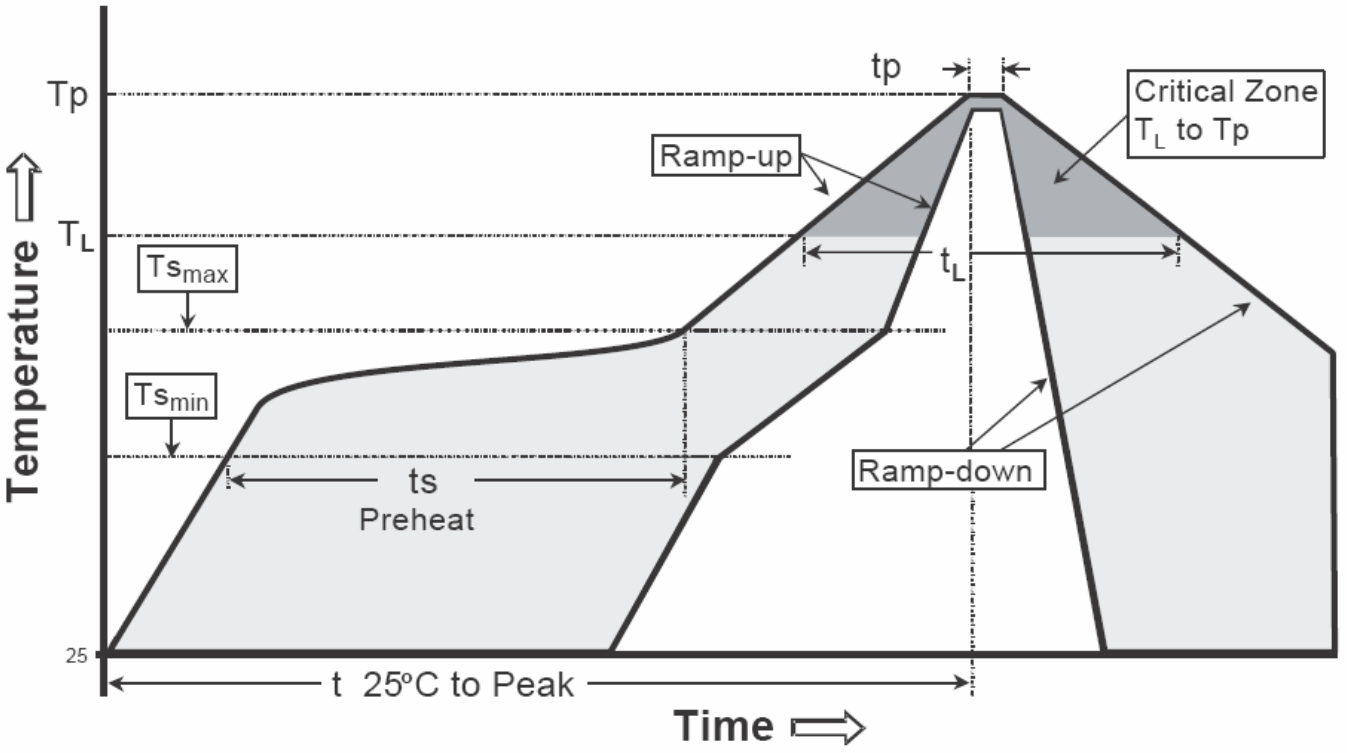


Unit : mm

Recommended wave soldering condition

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

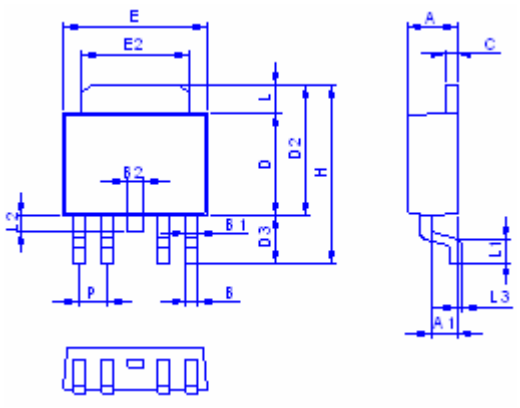
Recommended temperature profile for IR reflow



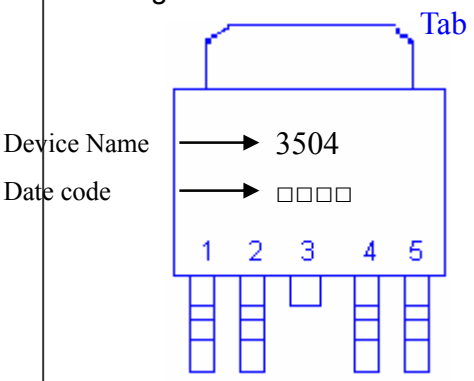
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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-252 Dimension



Marking:



Style: Pin 1.Soure 1 2.Gate 1 3.&Tab
Drain 1& Drain 2 4. Source 2 5. Gate 2

4-Lead TO-252 Plastic Surface Mount Package
CYStek Package Code: J4

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.0826	0.0984	2.10	2.50	E	0.2480	0.2638	6.30	6.70
A1	0.0433	0.0512	1.10	1.30	E2	0.1890	0.2146	4.80	5.45
B	0.0118	0.0276	0.30	0.70	H	0.3622	0.3996	9.20	10.15
B1	0.0217	0.0295	0.55	0.75	L	0.0512	0.0669	1.30	1.70
B2	0.0157	0.0315	0.40	0.80	L1	0.0354	0.0590	0.90	1.50
C	0.157	0.0236	0.40	0.60	L2	0.0197	0.0433	0.50	1.10
D	0.2087	0.2244	5.30	5.70	L3	0.0000	0.0118	0.00	0.30
D2	0.2638	0.2874	6.70	7.30	P	0.0461	0.0539	1.17	1.37
D3	0.0866	0.1181	2.20	3.00					

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 : KFC; Pure tin plated
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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