

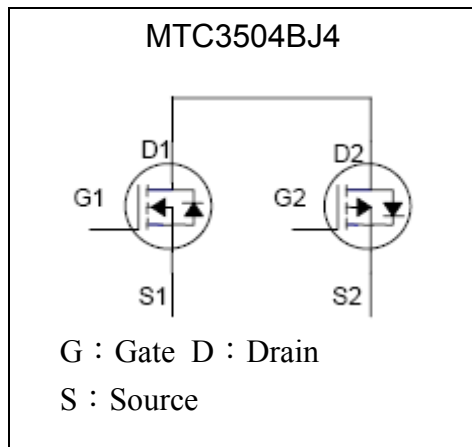
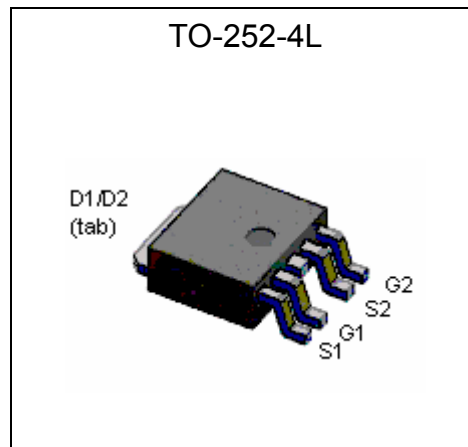
**N & P-Channel Enhancement Mode Power MOSFET**

# MTC3504BJ4

	N-CH	P-CH
$BV_{DSS}$	40V	-40V
$I_D$	12A	-9A
$R_{DS(on)(MAX)}$	35m $\Omega$	44m $\Omega$

**Features**

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

**Equivalent Circuit**

**Outline**

**Absolute Maximum Ratings** ( $T_C=25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	Limits		Unit
		N-channel	P-channel	
Drain-Source Voltage	$V_{DS}$	40	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	
Continuous Drain Current @ $T_C=25^\circ\text{C}$	$I_D$	12	-9	A
Continuous Drain Current @ $T_C=100^\circ\text{C}$	$I_D$	8	-6	
Pulsed Drain Current *1	$I_{DM}$	48	-36	
Total Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_d$	25		W
Total Power Dissipation ( $T_C=100^\circ\text{C}$ )		18		
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	-55~+175		$^\circ\text{C}$

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



**Thermal Data**

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

Note : \*1 62.5 $^{\circ}C/W$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.

**N-CH Characteristics (Tc=25 $^{\circ}C$ , unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
$BV_{DSS}$	40	-	-	V	$V_{GS}=0, I_D=250\mu A$
$V_{GS(th)}$	1.8	2.3	3.2	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$G_{FS}$ *1	-	19	-	S	$V_{DS}=5V, I_D=10A$
$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS}=\pm 20, V_{DS}=0$
$I_{DSS}$	-	-	1	$\mu A$	$V_{DS}=32V, V_{GS}=0$
	-	-	25	$\mu A$	$V_{DS}=30V, V_{GS}=0, T_j=125^{\circ}C$
$I_{D(ON)}$ *1	12	-	-	A	$V_{DS}=5V, V_{GS}=10V$
$R_{DS(ON)}$ *1	-	30	35	m $\Omega$	$V_{GS}=10V, I_D=10A$
	-	40	50	m $\Omega$	$V_{GS}=7V, I_D=8A$
<b>Dynamic</b>					
$Q_g$ *1	-	9.1	-	nC	$I_D=15A, V_{DS}=20V, V_{GS}=10V$
$Q_{gs}$ *1	-	2.3	-		
$Q_{gd}$ *1	-	3	-		
$t_{d(ON)}$ *1	-	2.5	-	ns	$V_{DS}=10V, I_D=1A, V_{GS}=10V, R_G=6\Omega$
$t_r$ *1	-	7.5	-		
$t_{d(OFF)}$ *1	-	12	-		
$t_f$ *1	-	4	-	pF	$V_{GS}=0V, V_{DS}=20V, f=1MHz$
$C_{iss}$	-	796	-		
$C_{oss}$	-	84	-		
$C_{rSS}$	-	59	-		
<b>Source-Drain Diode</b>					
$I_S$ *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  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$

\*2.Pulse width limited by maximum junction temperature.



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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	-40	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =-250μA
V <sub>GS(th)</sub>	-1.8	-2.3	-3.2	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA
G <sub>FS</sub> *1	-	11	-	S	V <sub>DS</sub> =-5V, I <sub>D</sub> =-8A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20, V <sub>DS</sub> =0
I <sub>DSS</sub>	-	-	-1	μA	V <sub>DS</sub> =-32V, V <sub>GS</sub> =0
	-	-	-25	μA	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0, T <sub>j</sub> =125°C
I <sub>D(ON)</sub> *1	-9	-	-	A	V <sub>DS</sub> =-5V, V <sub>GS</sub> =-10V
R <sub>D(S(ON))</sub> *1	-	38	44	mΩ	V <sub>GS</sub> =-10V, I <sub>D</sub> =-8A
	-	50	70	mΩ	V <sub>GS</sub> =-7V, I <sub>D</sub> =-6A
<b>Dynamic</b>					
Q <sub>g</sub> *1	-	11.5	-	nC	I <sub>D</sub> =-10A, V <sub>DS</sub> =-20V, V <sub>GS</sub> =-10V
Q <sub>gs</sub> *1	-	2.5	-		
Q <sub>gd</sub> *1	-	3.2	-		
t <sub>d(ON)</sub> *1	-	7	-	ns	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1A, V <sub>GS</sub> =-10V, R <sub>G</sub> =6Ω
t <sub>r</sub> *1	-	10	-		
t <sub>d(OFF)</sub> *1	-	20	-		
t <sub>f</sub> *1	-	12	-		
C <sub>iss</sub>	-	1223	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =-20V, f=1MHz
C <sub>oss</sub>	-	405	-		
C <sub>rss</sub>	-	366	-		
<b>Source-Drain Diode</b>					
I <sub>S</sub> *1	-	-	-9	A	
I <sub>SM</sub> *2	-	-	-36		
V <sub>SD</sub> *1	-	-	-1.3	V	I <sub>F</sub> =I <sub>S</sub> , V <sub>GS</sub> =0V

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

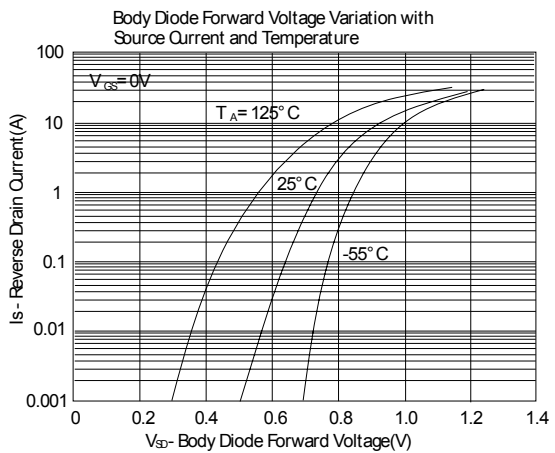
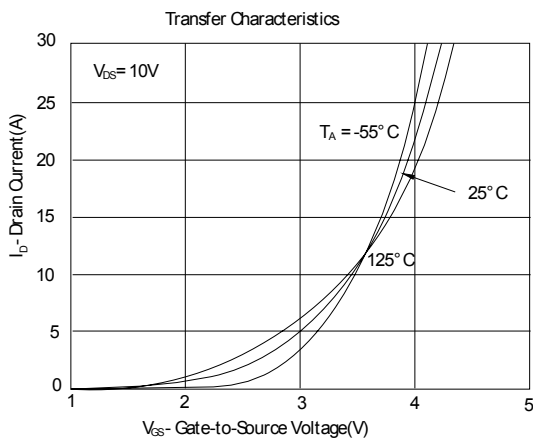
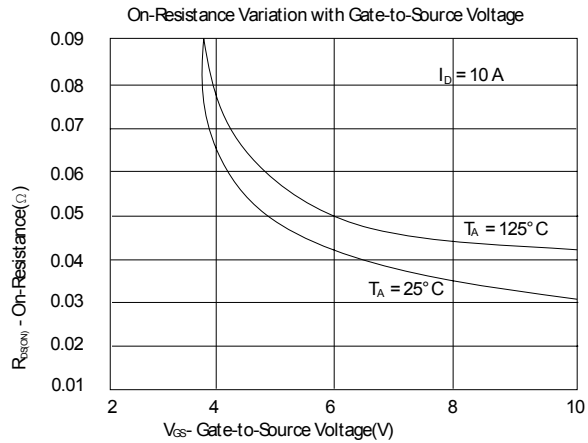
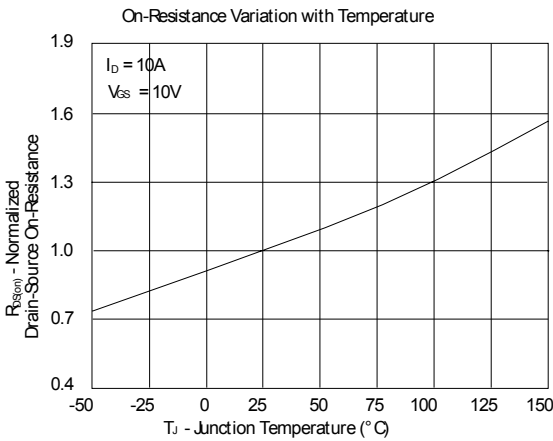
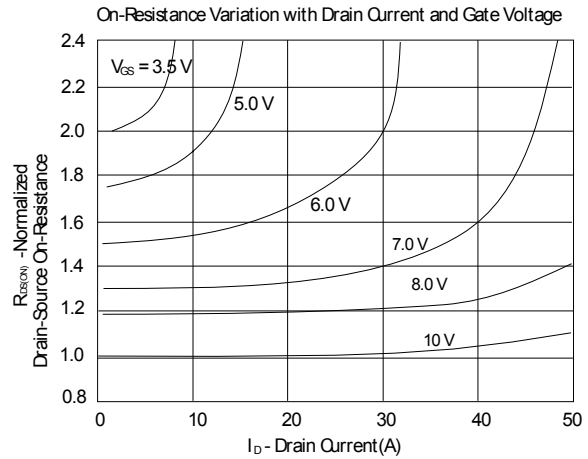
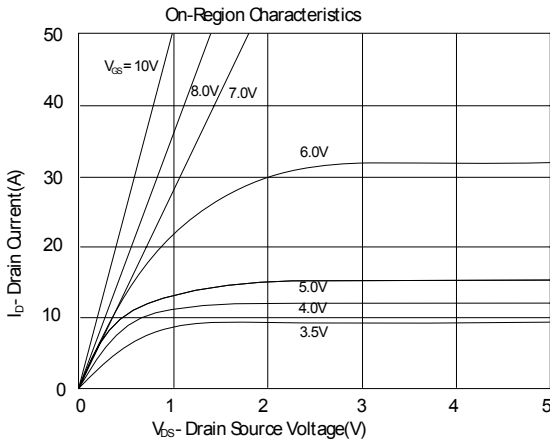
\*2.Pulse width limited by maximum junction temperature.

**Ordering Information**

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

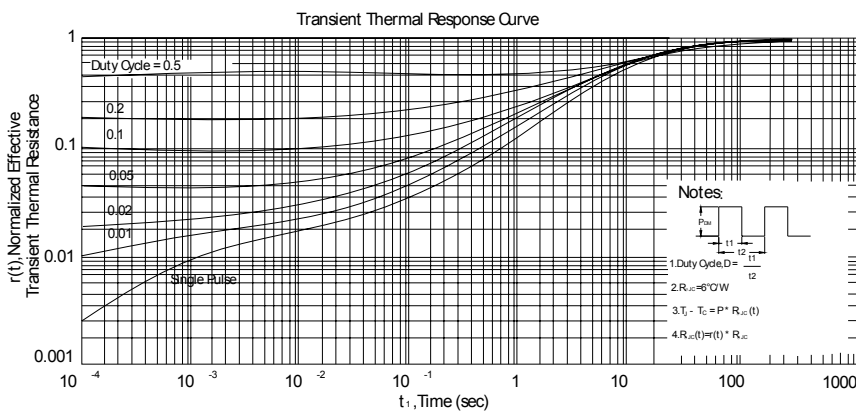
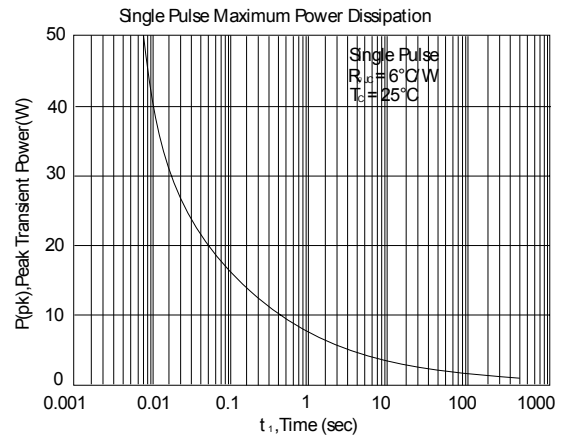
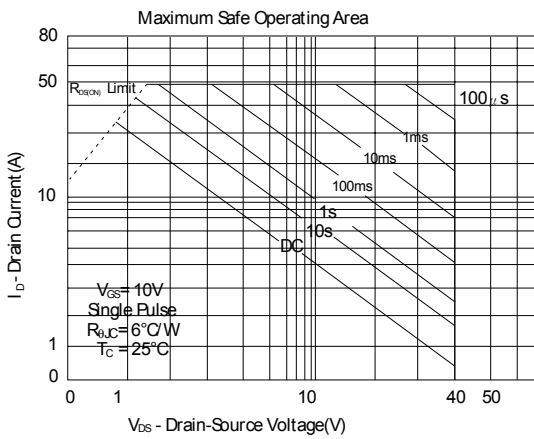
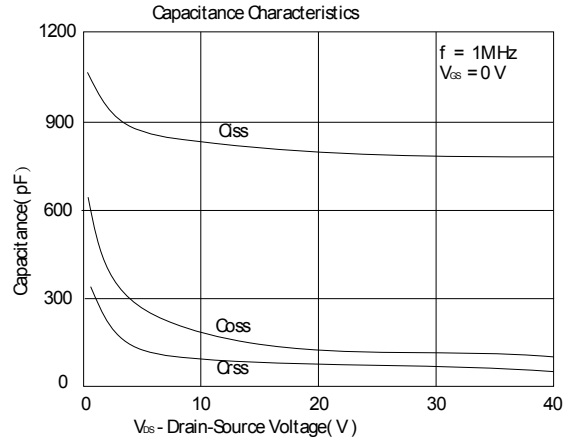
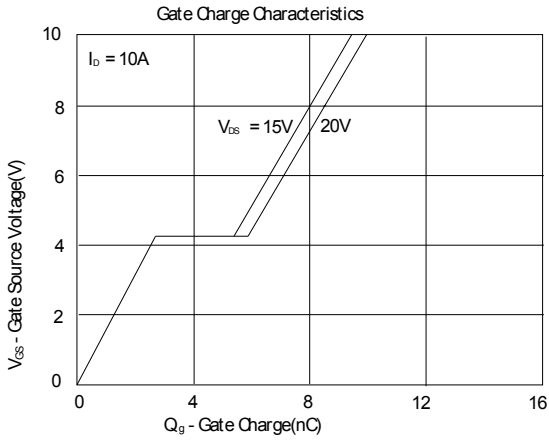
## Characteristic Curves

### N-Channel





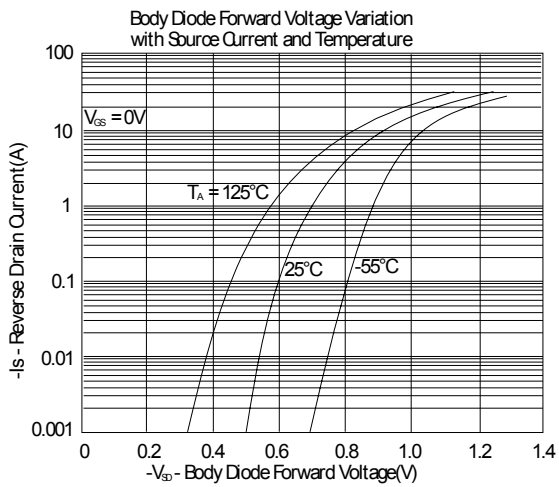
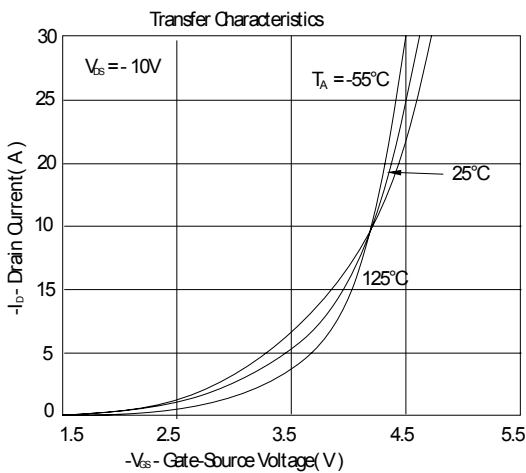
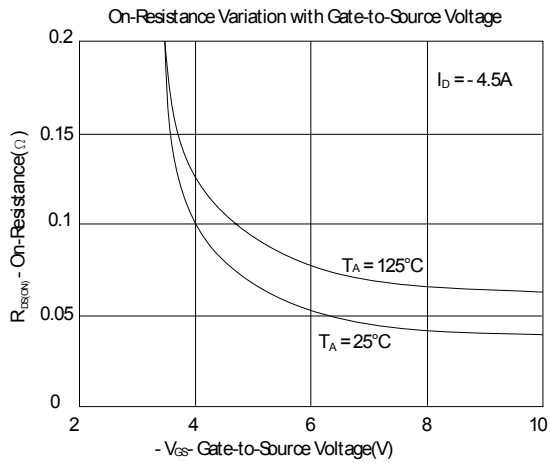
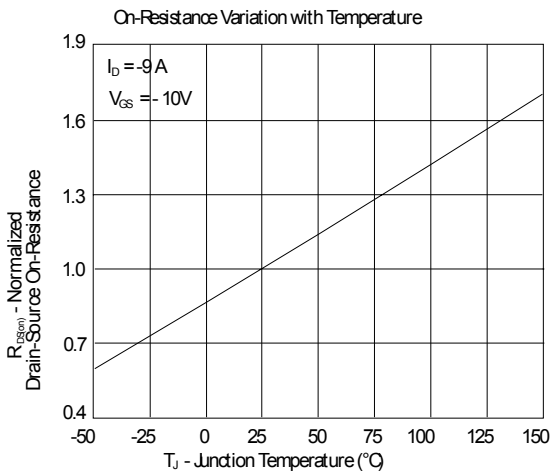
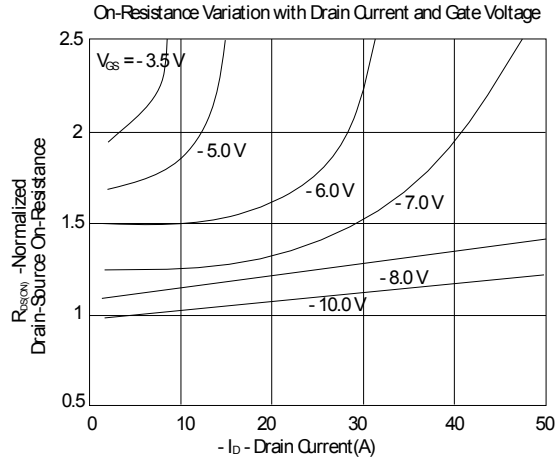
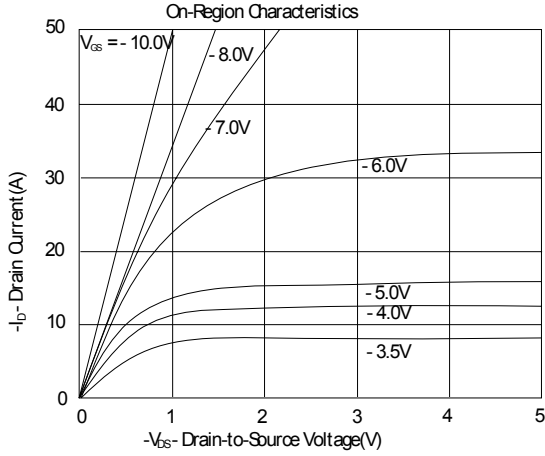
**Characteristic Curves(Cont.)**





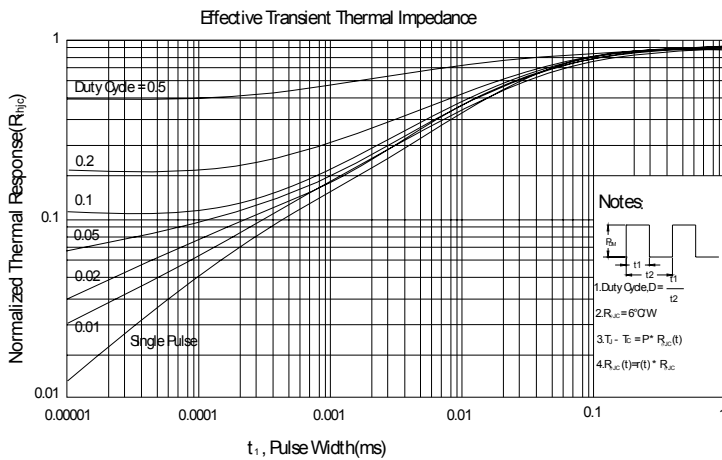
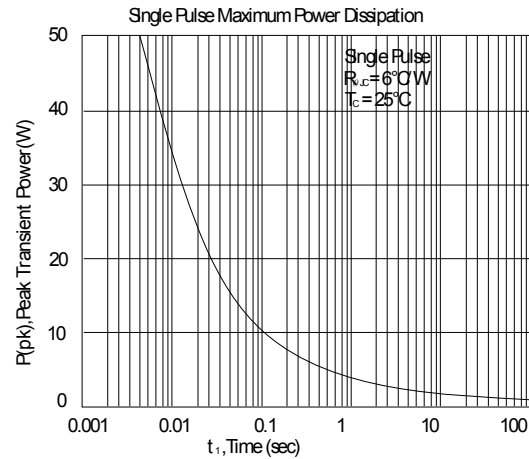
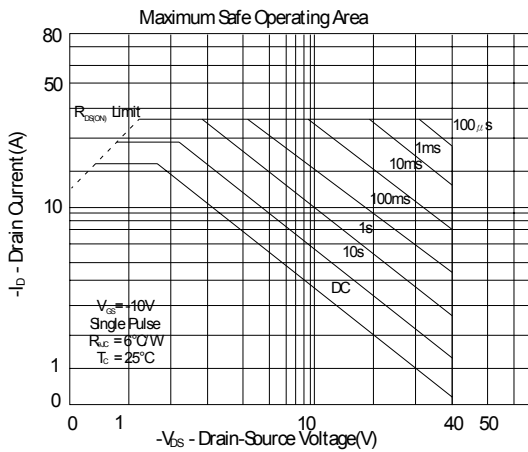
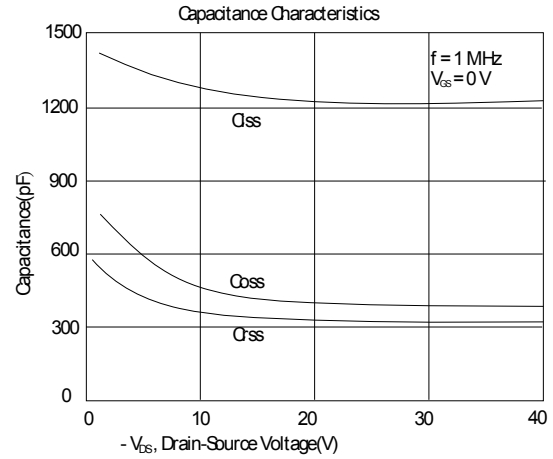
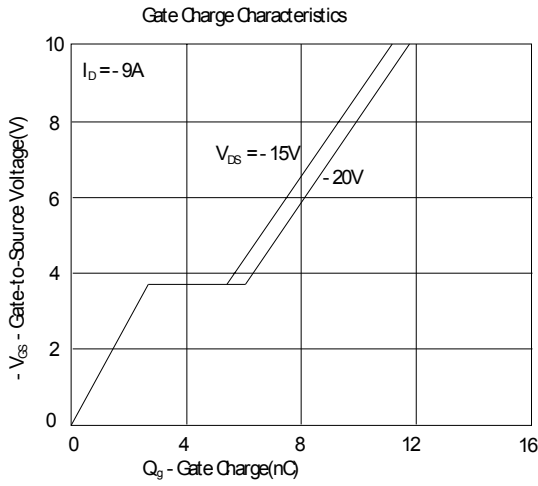
**Characteristic Curves(Cont.)**

**P-Channel**

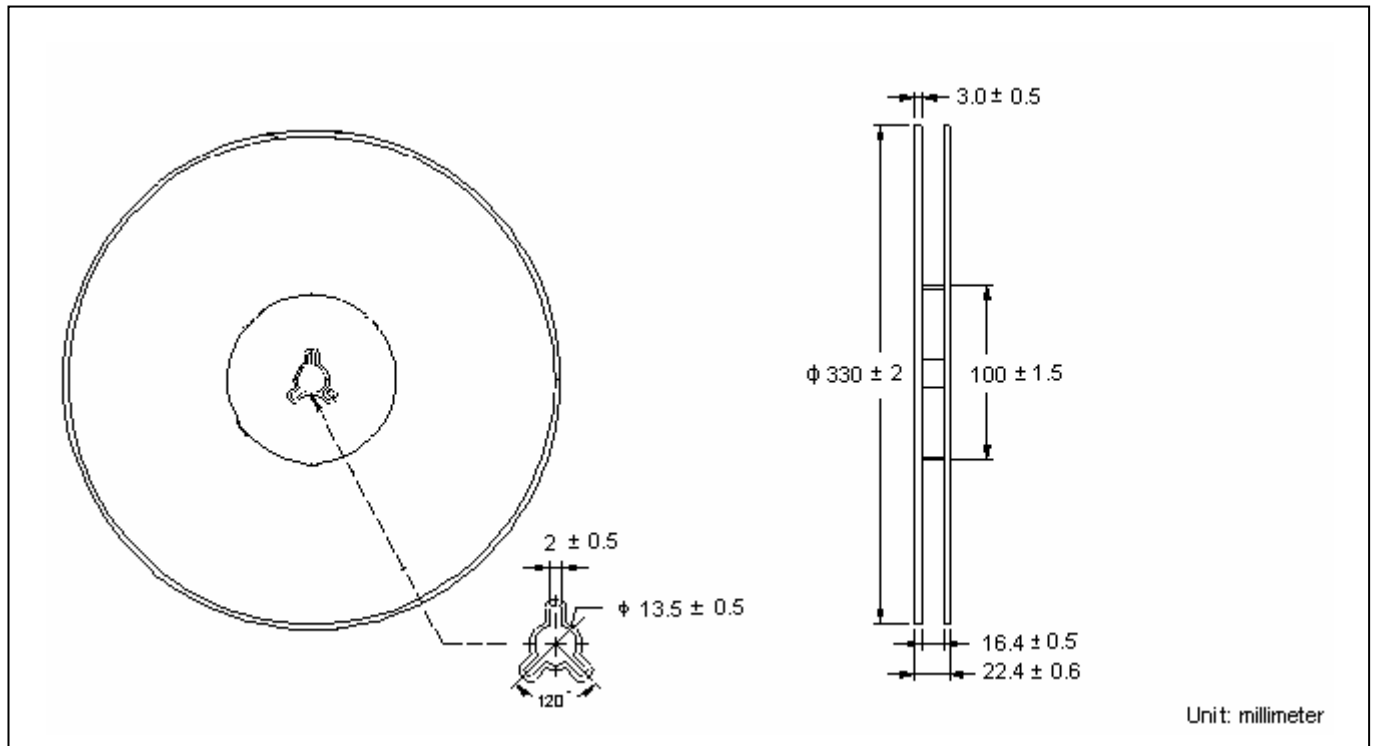




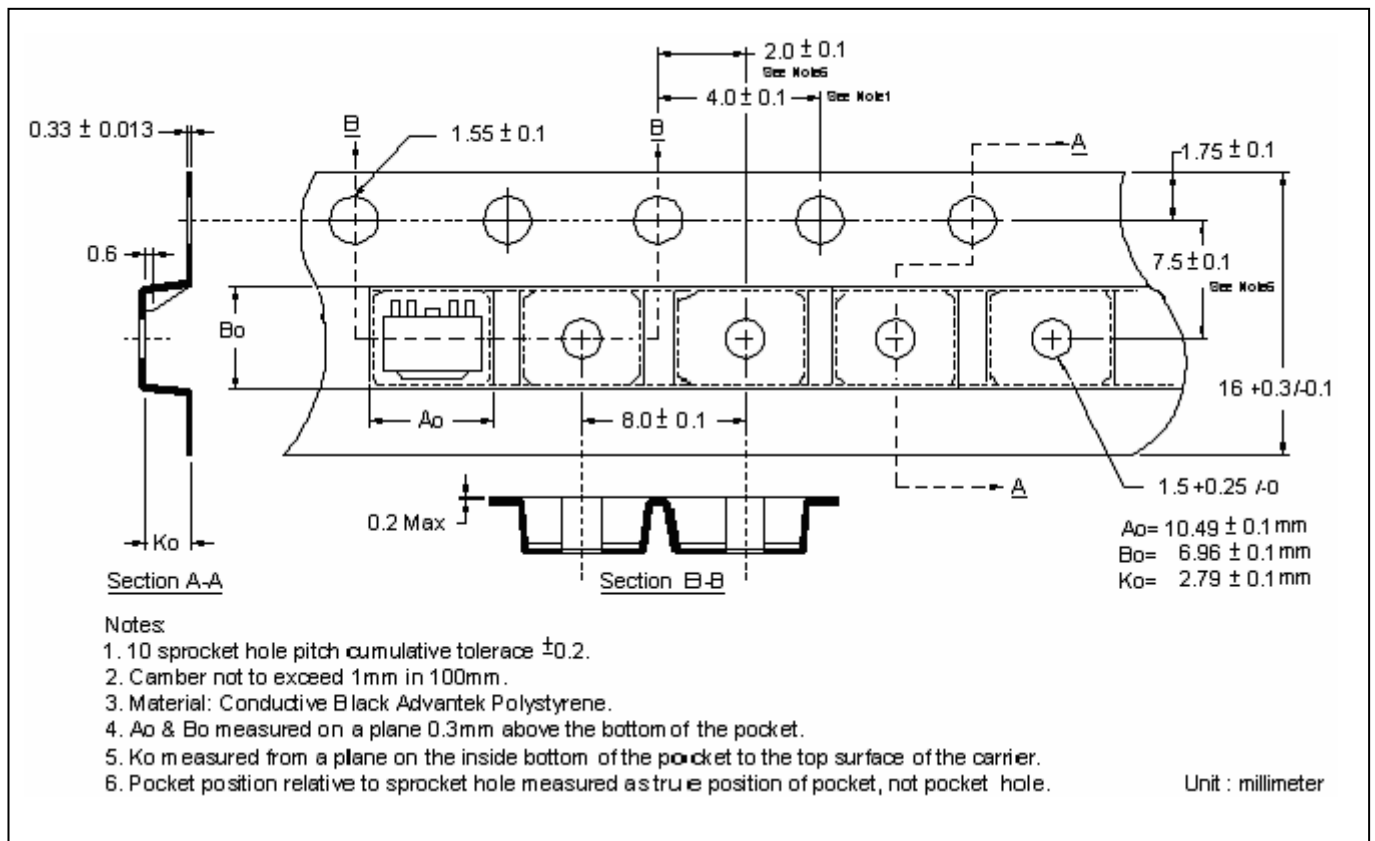
**Characteristic Curves(Cont.)**



### Reel Dimension



### Carrier Tape Dimension

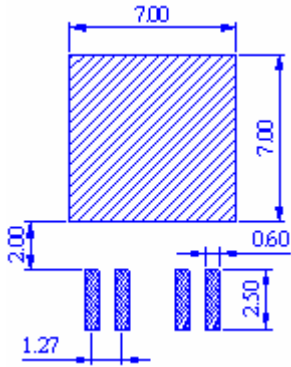


**Notes:**

1. 10 sprocket hole pitch cumulative tolerance  $\pm 0.2$ .
2. Camber not to exceed 1mm in 100mm.
3. Material: Conductive Black Advantek Polystyrene.
4.  $A_0$  &  $B_0$  measured on a plane 0.3mm above the bottom of the pocket.
5.  $K_0$  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.



**Recommended soldering footprint**

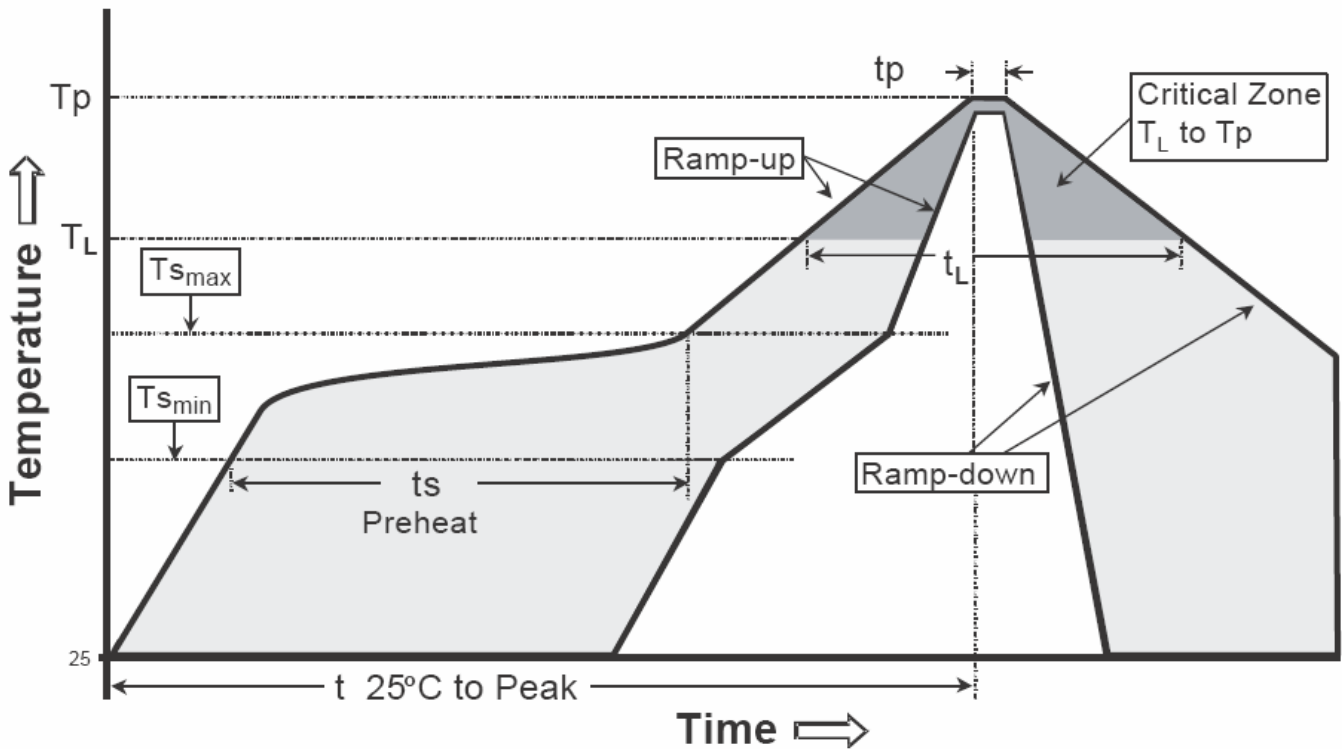


Unit : mm

**Recommended wave soldering condition**

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

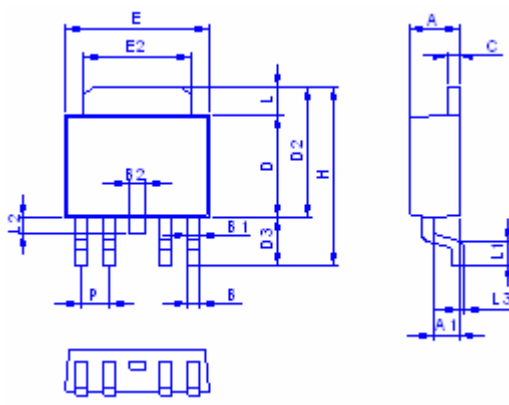
**Recommended temperature profile for IR reflow**



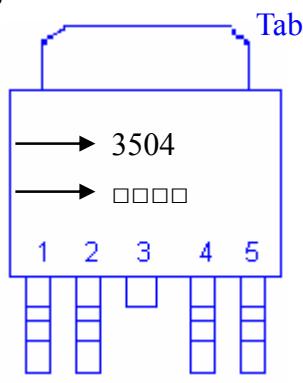
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)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

**TO-252 Dimension**



**Marking:**



Device Name → 3504  
 Date code → □□□□

1 2 3 4 5

Tab

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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