

**Dual N-Channel Logic Level Enhancement Mode Power MOSFET**

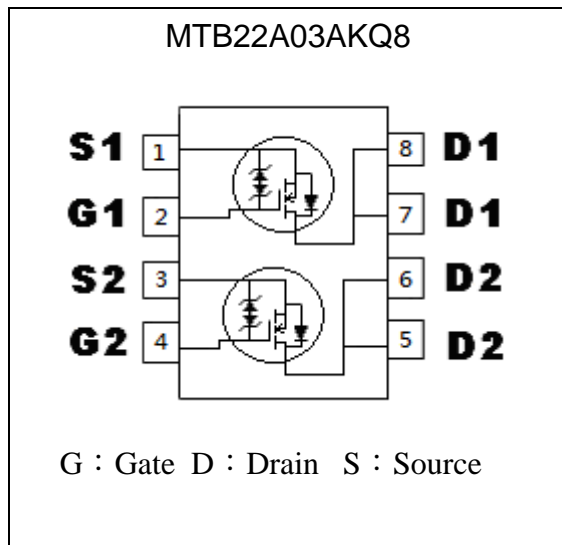
# MTB22A03AKQ8

<b>BV<sub>DSS</sub></b>	<b>30V</b>
<b>I<sub>D</sub>@V<sub>GS</sub>=10V, T<sub>A</sub>=25°C</b>	<b>7A</b>
<b>I<sub>D</sub>@V<sub>GS</sub>=10V, T<sub>A</sub>=70°C</b>	<b>5.6A</b>
<b>R<sub>DSON</sub>@V<sub>GS</sub>=10V, I<sub>D</sub>=7A</b>	<b>13 mΩ (typ)</b>
<b>R<sub>DSON</sub>@V<sub>GS</sub>=4.5V, I<sub>D</sub>=7A</b>	<b>18 mΩ (typ)</b>
<b>R<sub>DSON</sub>@V<sub>GS</sub>=4V, I<sub>D</sub>=7A</b>	<b>20 mΩ (typ)</b>

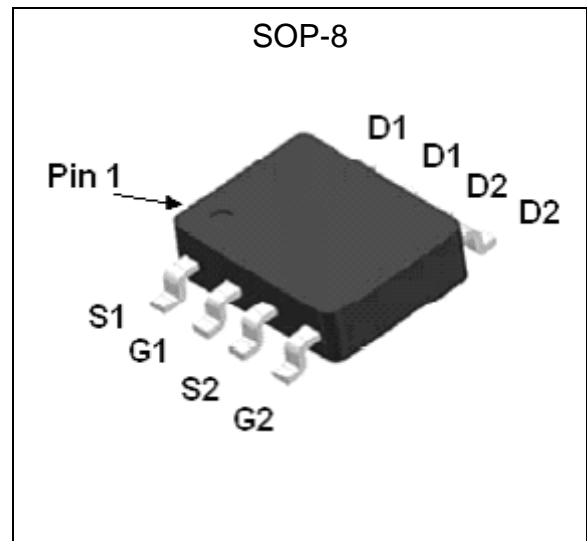
### Features

- Single Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- ESD Protected
- Pb-free & Halogen-free package

### Symbol

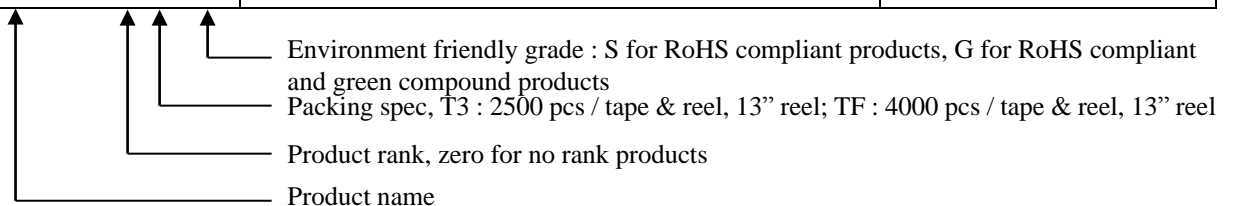


### Outline



### Ordering Information

Device	Package	Shipping
MTB22A03AKQ8-0-T3-G	SOP-8	2500 pcs / Tape & Reel
MTB22A03AKQ8-0-TF-G	(Pb-free lead plating & halogen-free package)	4000 pcs / Tape & Reel





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

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	
Continuous Drain Current (Note 2)	T <sub>A</sub> =25°C, V <sub>GS</sub> =10V	I <sub>D</sub>	7
	T <sub>A</sub> =70°C, V <sub>GS</sub> =10V	I <sub>D</sub>	5.6
Pulsed Drain Current (Note 1)	I <sub>DM</sub>	40	A
Avalanche Current	I <sub>AS</sub>	7	
Avalanche Energy @ L=1mH, I <sub>D</sub> =7A, R <sub>G</sub> =25Ω	E <sub>AS</sub>	24.5	mJ
Power Dissipation for Dual Operation	P <sub>D</sub>	2	W
Power Dissipation for Single Operation		1.6 (Note 2)	
		0.9 (Note 3)	
Operating Junction and Storage Temperature	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>th,j-c</sub>	40	°C/W
Thermal Resistance, Junction-to-ambient, max, dual	R <sub>th,j-a</sub>	62.5	
Thermal Resistance, Junction-to-ambient, max, single operation		78 (Note 2)	
		135 (Note 3)	

- Note : 1. Pulse width limited by maximum junction temperature.  
 2. Surface mounted on 1 in<sup>2</sup> pad of 2 oz copper, t≤10s.  
 3. Surface mounted on minimum copper pad, pulse width≤10s.

**Characteristics (T<sub>j</sub>=25°C, unless otherwise specified)**

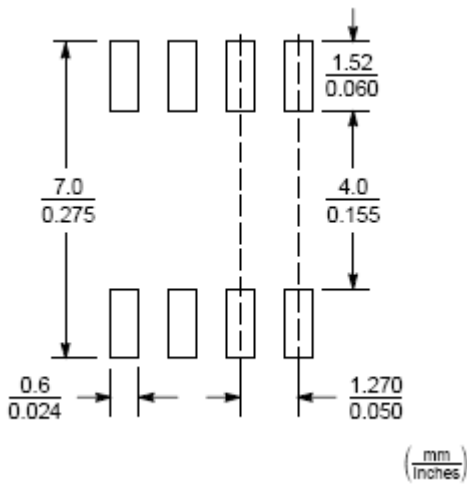
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1.0	-	2.5		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub>	-	8	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =6A
I <sub>GSS</sub>	-	-	±10	μA	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1		V <sub>DS</sub> =30V, V <sub>GS</sub> =0V
	-	-	5		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>j</sub> =55°C
*R <sub>DS(ON)</sub>	-	13	18	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =7A
	-	18	23		V <sub>GS</sub> =4.5V, I <sub>D</sub> =7A
	-	20	26		V <sub>GS</sub> =4V, I <sub>D</sub> =7A
<b>Dynamic</b>					
Q <sub>g</sub> (V <sub>GS</sub> =10V) *1, 2	-	11.6	-	nC	I <sub>D</sub> =8A, V <sub>DS</sub> =15V, V <sub>GS</sub> =10V
Q <sub>g</sub> (V <sub>GS</sub> =5V) *1, 2	-	5.9	-		
Q <sub>gs</sub> *1, 2	-	1.8	-		
Q <sub>gd</sub> *1, 2	-	2.7	-		
C <sub>iss</sub>	-	467	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz
C <sub>oss</sub>	-	73	-		
C <sub>rss</sub>	-	59	-		

**Characteristics (Cont. T<sub>j</sub>=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Dynamic</b>					
t <sub>d(ON)</sub> *1, 2	-	5.2	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =8.3A, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω
t <sub>r</sub> *1, 2	-	19.2	-		
t <sub>d(OFF)</sub> *1, 2	-	34	-		
t <sub>f</sub> *1, 2	-	7.8	-		
<b>Source-Drain Diode Ratings and Characteristics</b>					
I <sub>S</sub> *1	-	-	2.3	A	
I <sub>SM</sub> *3	-	-	9.2		
V <sub>SD</sub> *1	-	0.76	1.0	V	I <sub>S</sub> =1A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	7.5	-	ns	I <sub>F</sub> =8A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	3.3	-	nC	

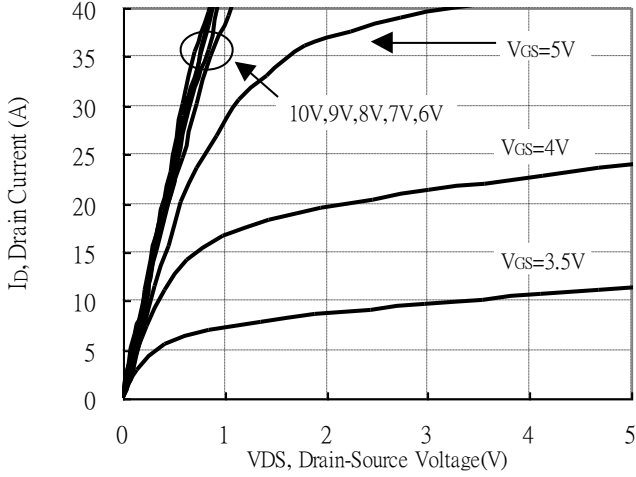
Note : \*1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%  
 \*2.Independent of operating temperature  
 \*3.Pulse width limited by maximum junction temperature.

**Recommended Soldering Footprint**

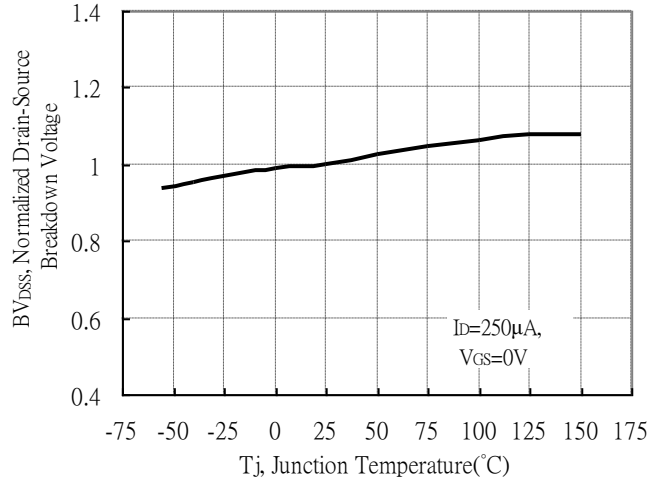


**Typical Characteristics**

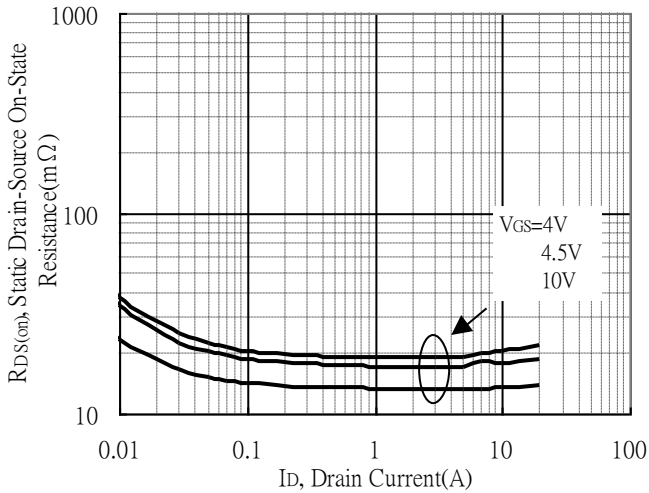
Typical Output Characteristics



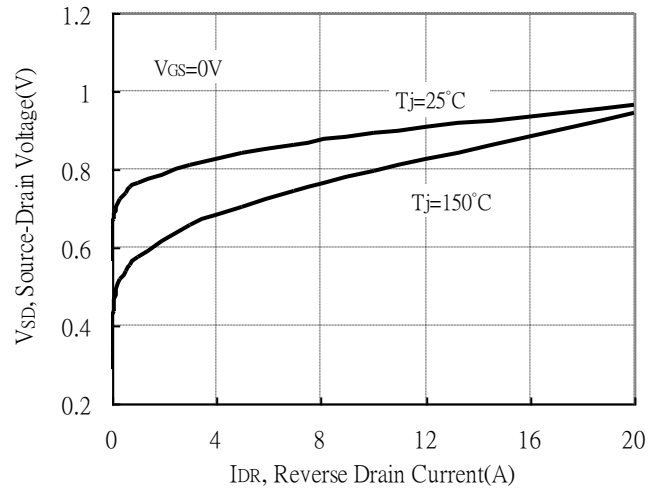
Brekdown Voltage vs Junction Temperature



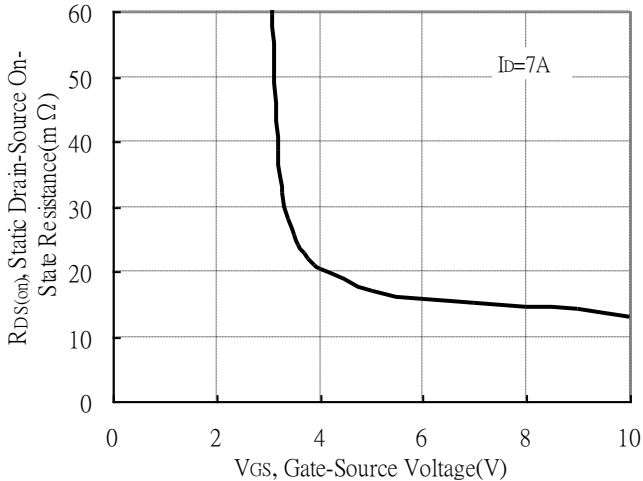
Static Drain-Source On-State resistance vs Drain Current



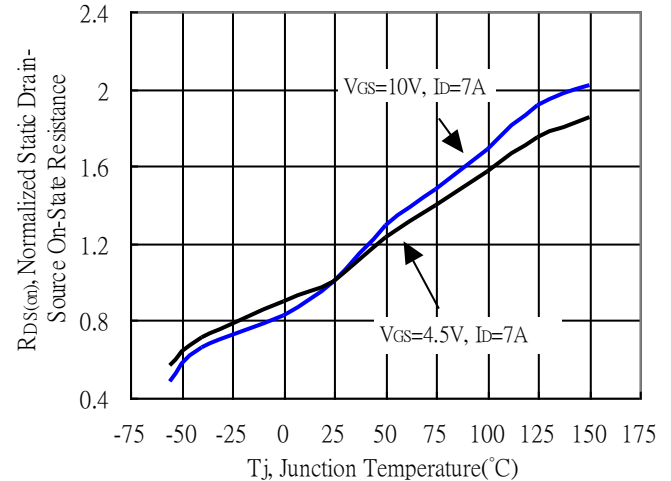
Reverse Drain Current vs Source-Drain Voltage



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

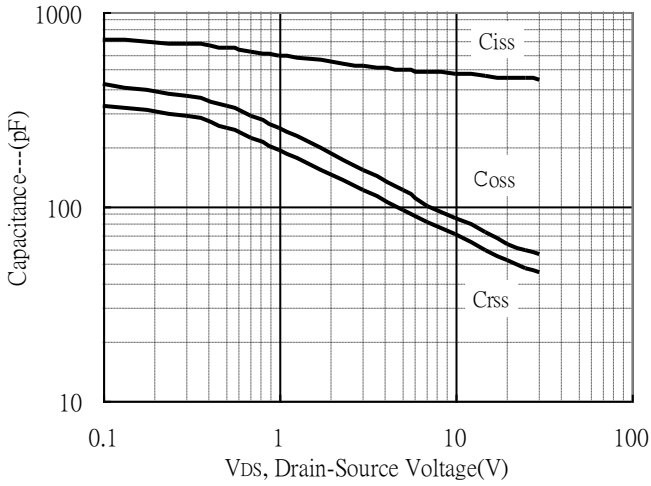


Drain-Source On-State Resistance vs Junction Temperature

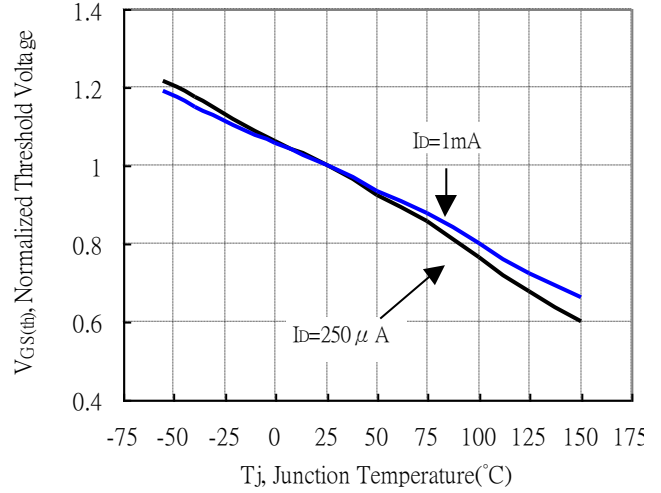


**Typical Characteristics(Cont.)**

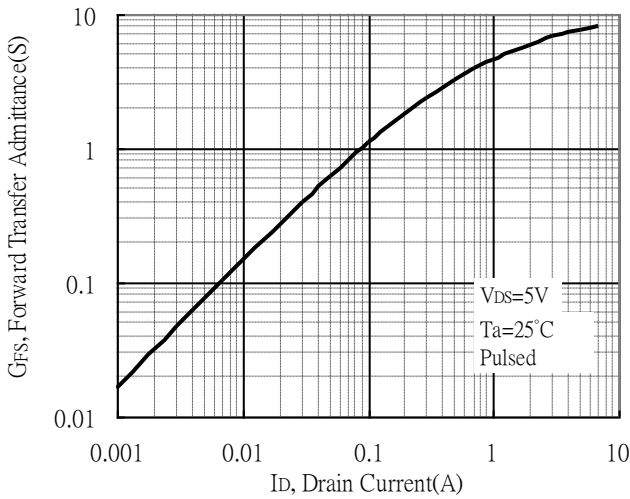
Capacitance vs Drain-to-Source Voltage



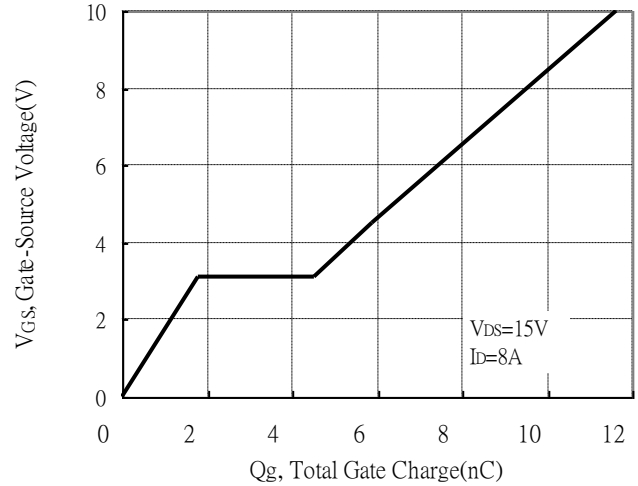
Threshold Voltage vs Junction Temperature



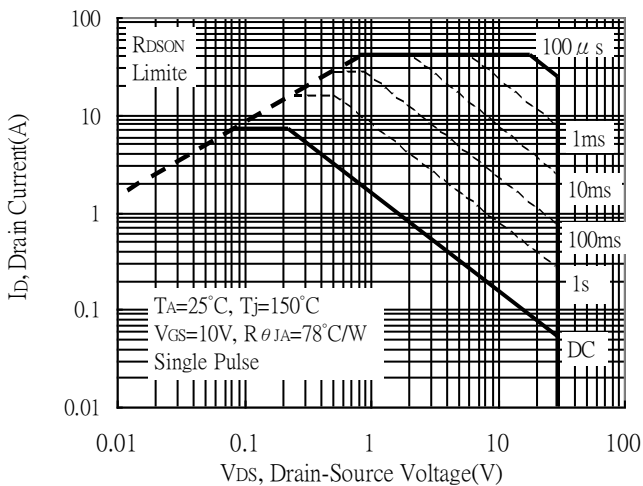
Forward Transfer Admittance vs Drain Current



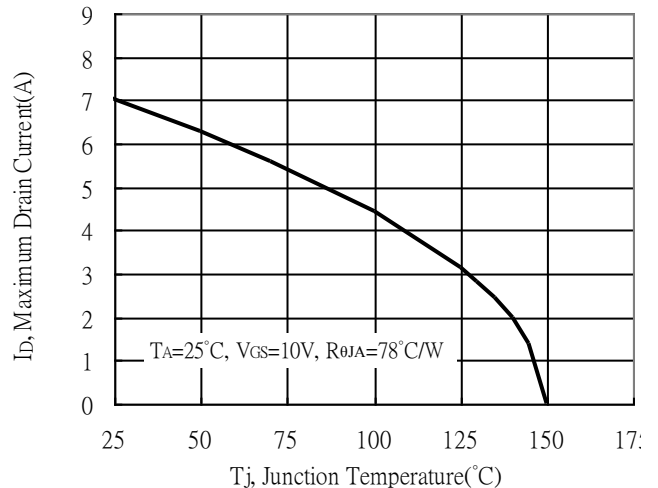
Gate Charge Characteristics



Maximum Safe Operating Area



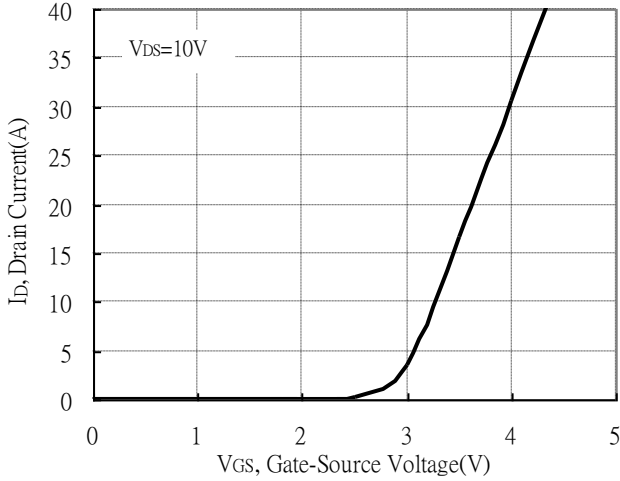
Maximum Drain Current vs Junction Temperature



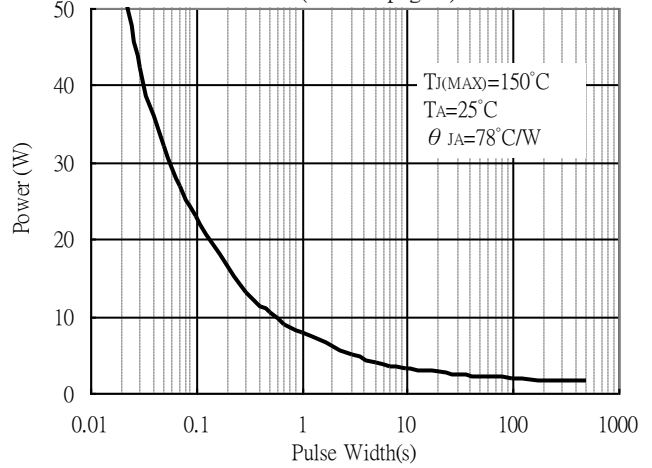


**Typical Characteristics(Cont.)**

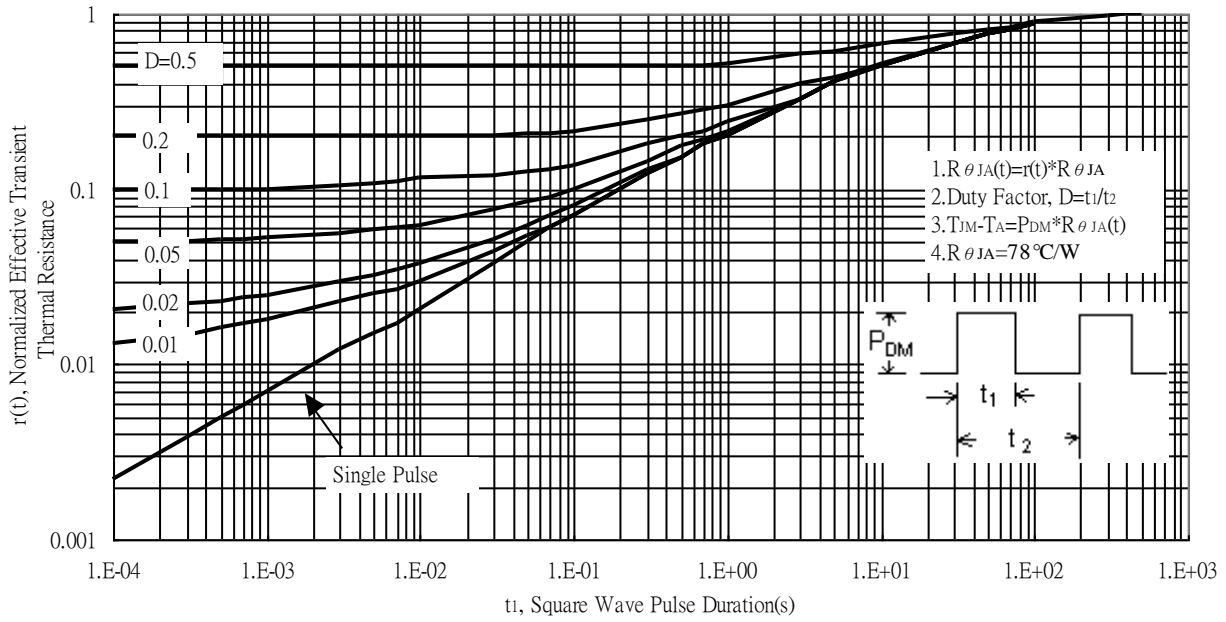
Typical Transfer Characteristics



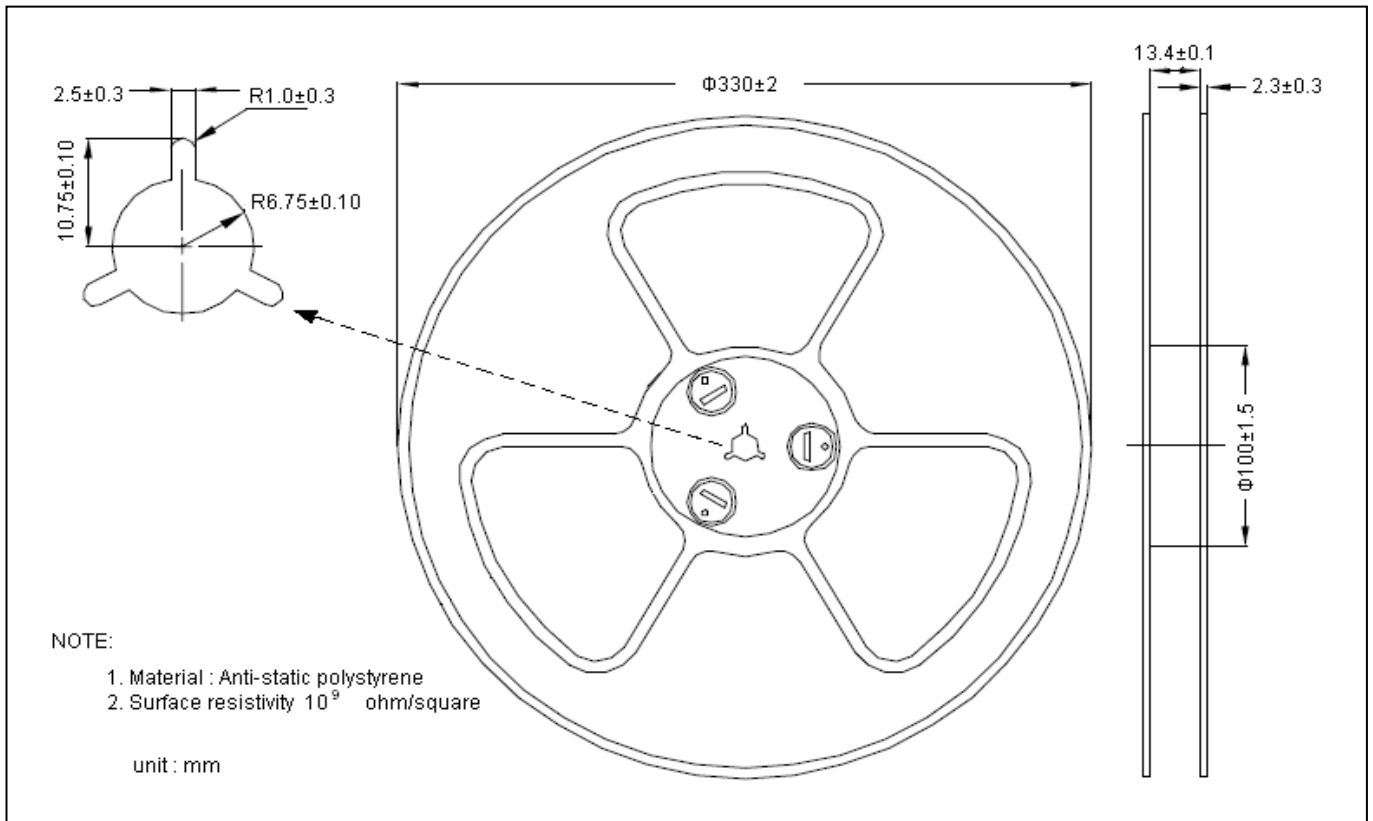
Single Pulse Power Rating, Junction to Ambient  
 (Note on page 2)



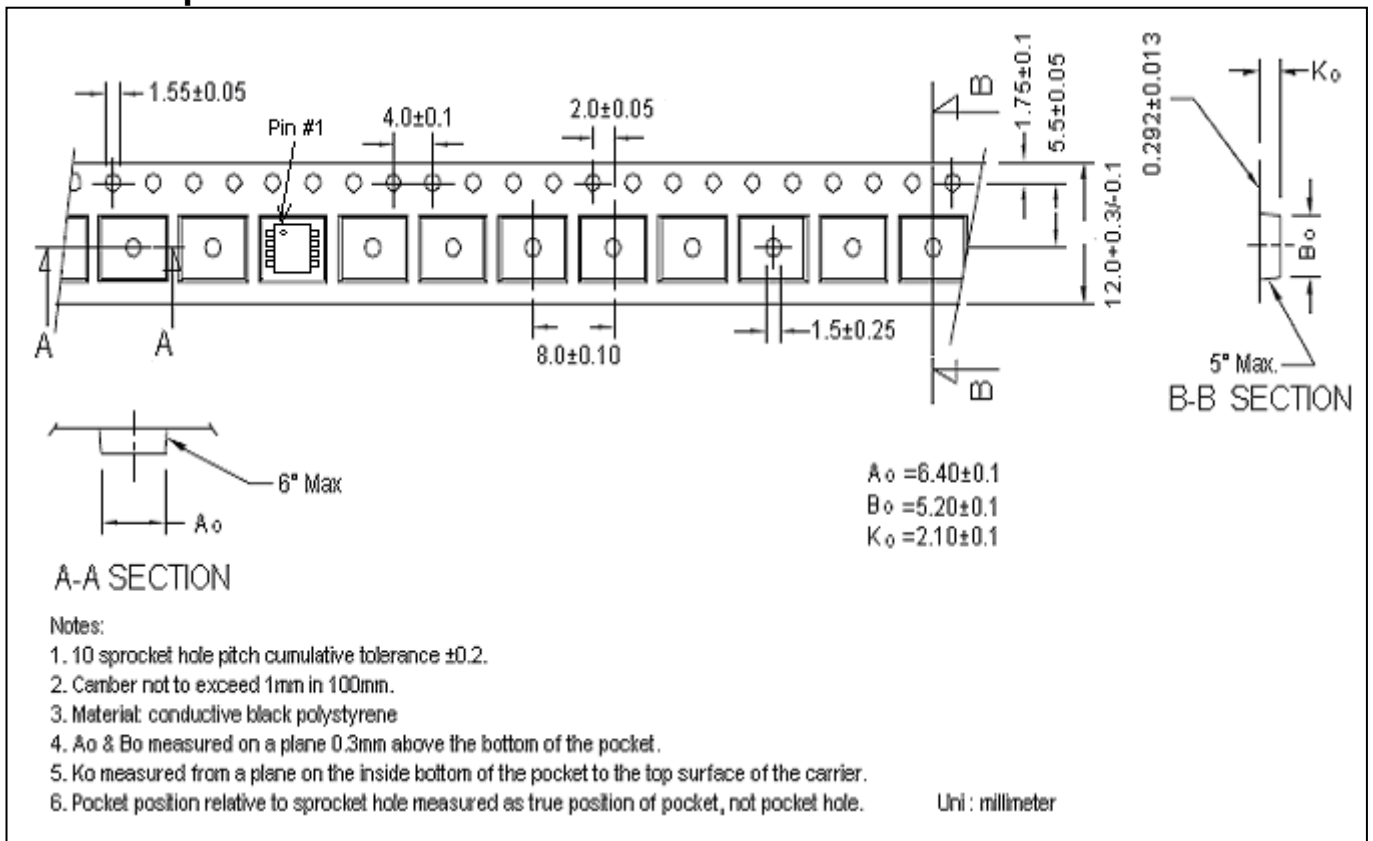
Transient Thermal Response Curves



**Reel Dimension**



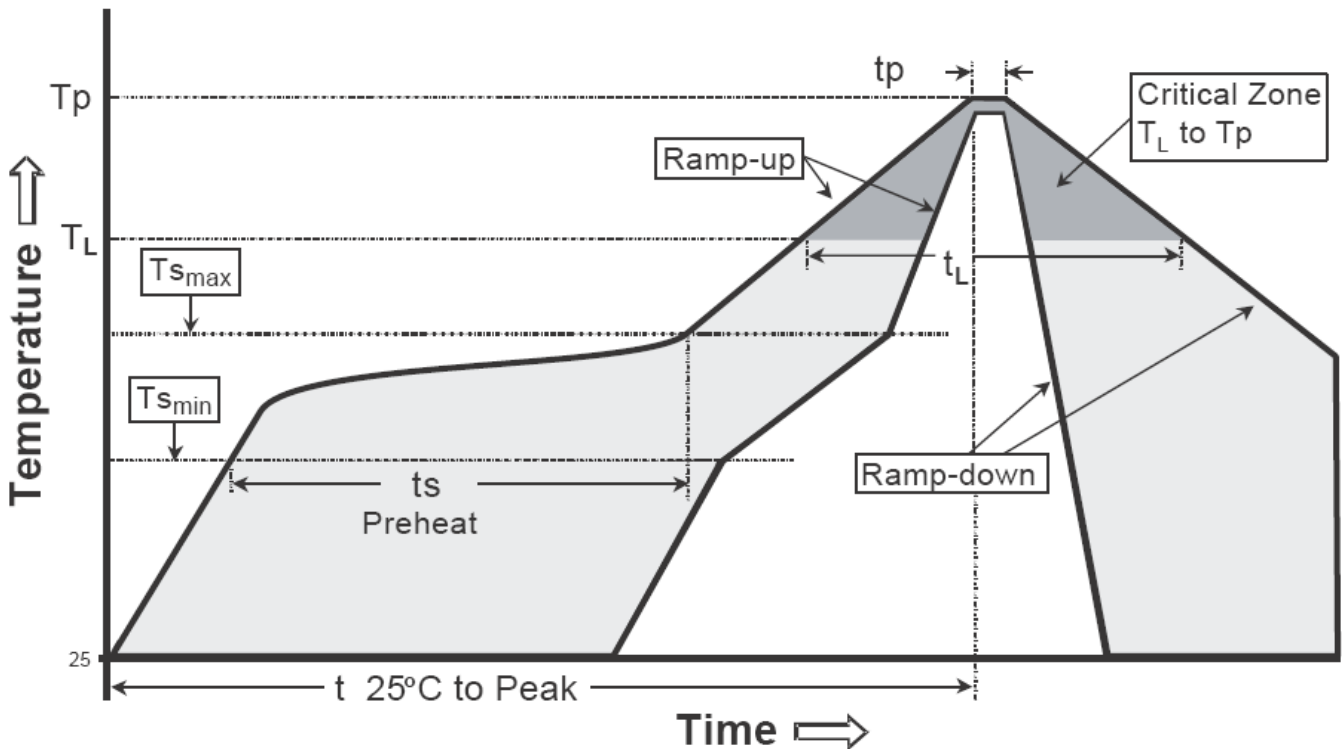
**Carrier Tape Dimension**



**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**

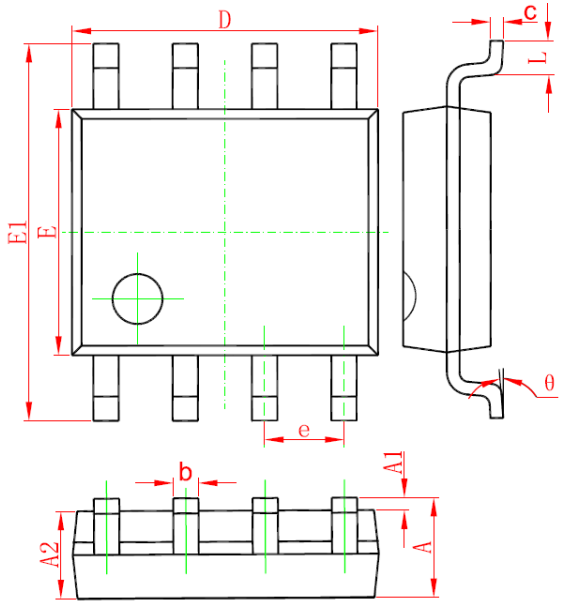


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub>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

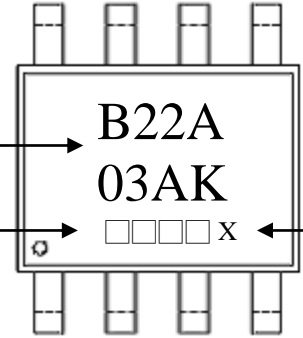


**SOP-8 Dimension**



The diagram shows three views of an 8-lead SOP-8 package: a top view with dimensions D (width), E (height), and E1 (total height including leads); a side view with dimensions L (lead length), c (lead thickness), and θ (lead angle); and a bottom view with dimensions A (height), A1 (lead height), A2 (height to lead base), and b (lead pitch). Dimension e is also shown as the distance between lead centers.

**Marking:**



The marking diagram shows the top of the package with the following markings: "B22A" (Device Code), "03AK" (Date Code), and four squares followed by an "X" (Assembly site code).

Device Code → B22A  
 Date Code → 03AK  
 Assembly site code → □□□□ X

Date Code(counting from left to right) :  
 1<sup>st</sup> code: year code, the last digit of Christian year  
 2<sup>nd</sup> code : month code, Jan→A, Feb→B, Mar→C, Apr→D  
           May→E, Jun→F, Jul→G, Aug→H, Sep→J,  
           Oct→K, Nov→L, Dec→M  
 3<sup>rd</sup> and 4<sup>th</sup> codes : production serial number, 01~99  
 Assembly site code : blank→ site 1, G →site 2

**8-Lead SOP-8 Plastic Package**  
**CYStek Package Code: Q8**

\*: Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069	E	3.800	4.000	0.150	0.157
A1	0.100	0.250	0.004	0.010	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	e	*1.270		*0.050	
b	0.330	0.510	0.013	0.020	L	0.400	1.270	0.016	0.050
c	0.170	0.250	0.006	0.010	θ	0°	8°	0°	8°
D	4.700	5.100	0.185	0.200					

**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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