

**P-Channel Enhancement Mode MOSFET**

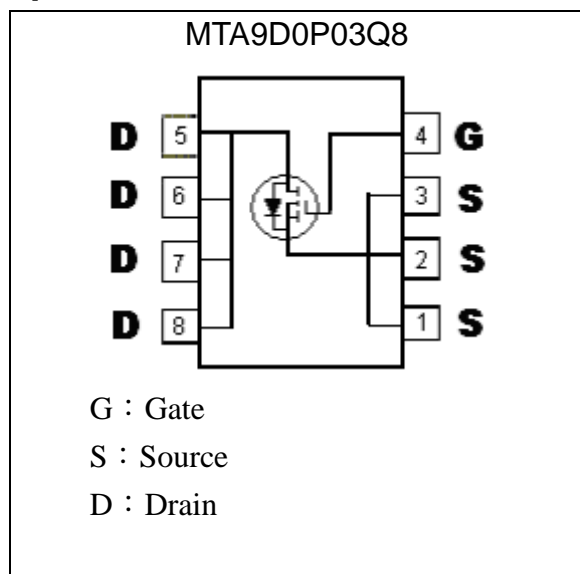
# MTA9D0P03Q8

|   |              |
|---|--------------|
| BV <sub>DSS</sub>   | -30V         |
| I <sub>D</sub> @V <sub>GS</sub> =-10V, T <sub>A</sub> =25°C     | -14A         |
| I <sub>D</sub> @V <sub>GS</sub> =-10V, T <sub>A</sub> =70°C     | -11.2A       |
| R <sub>DSON</sub> @V <sub>GS</sub> =-10V, I <sub>D</sub> =-12A  | 10mΩ (typ)   |
| R <sub>DSON</sub> @V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A | 13.2mΩ (typ) |
| R <sub>DSON</sub> @V <sub>GS</sub> =-3V, I <sub>D</sub> =-5A    | 23.5mΩ (typ) |

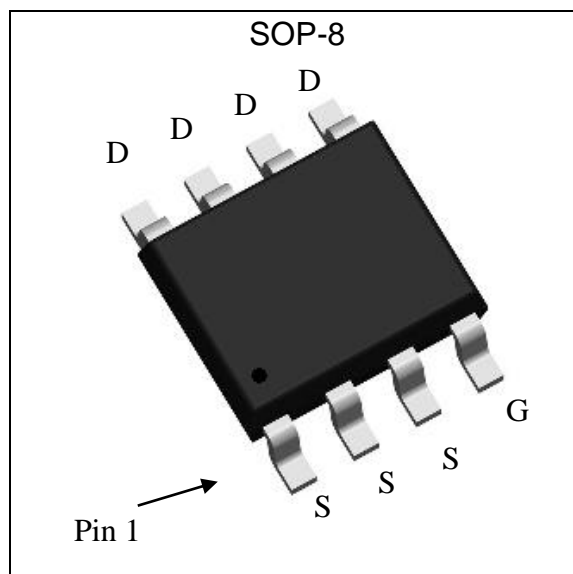
**Features**

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free lead plating and halogen-free package

**Equivalent Circuit**

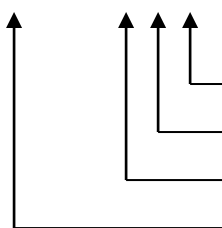


**Outline**



**Ordering Information**

| Device             | Package  | Shipping              |
|--------------------|--|-----------------------|
| MTA9D0P03Q8-0-T3-G | SOP-8<br>(Pb-free lead plating and halogen-free package) | 2500 pcs/ Tape & Reel |
| MTA9D0P03Q8-0-TF-G | SOP-8<br>(Pb-free lead plating and halogen-free package) | 4000 pcs/ Tape & Reel |



Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T3 : 2500 pcs / tape & reel, 13" reel ,TF : 4000 pcs/tape & reel, 13" reel

Product rank, zero for no rank products

Product name



**Absolute Maximum Ratings (Ta=25°C)**

| Parameter   | Symbol                            | Limits                | Unit |     |
|---|-----------------------------------|-----------------------|------|-----|
| Drain-Source Breakdown Voltage  | BV <sub>DSS</sub>                 | -30                   | V    |     |
| Gate-Source Voltage   | V <sub>GS</sub>                   | ±20                   |      |     |
| Continuous Drain Current @ V <sub>GS</sub> =-10V, T <sub>A</sub> =25°C (Note 1) | I <sub>D</sub>                    | -14                   | A    |     |
| Continuous Drain Current @ V <sub>GS</sub> =-10V, T <sub>A</sub> =70°C (Note 1) |                                   | -11.2                 |      |     |
| Pulsed Drain Current (Note 2)   |                                   | I <sub>DM</sub>       |      | -56 |
| Avalanche Current @ L=0.1mH   | I <sub>AS</sub>                   | -34                   |      |     |
| Avalanche Energy @ L=1mH, I <sub>D</sub> =-16A, V <sub>DD</sub> =-25V (Note 3)  | E <sub>AS</sub>                   | 128                   | mJ   |     |
| Total Power Dissipation (Note 1)  | P <sub>D</sub>                    | T <sub>A</sub> =25 °C | 3.1  | W   |
|   |                                   | T <sub>A</sub> =70 °C | 2    |     |
| Operating Junction and Storage Temperature                                      | T <sub>j</sub> , T <sub>stg</sub> | -55~+150              | °C   |     |

Note : 1.Surface mounted on FR-4 board, t≤10sec.  
 2.Pulse width ≤300μs, Duty Cycle≤2%  
 3.100% tested by conditions of V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-20A

**Thermal Data**

| Parameter                                    | Symbol           | Value      | Unit |
|--|------------------|------------|------|
| Thermal Resistance, Junction-to-case, max    | R <sub>θJC</sub> | 20         | °C/W |
| Thermal Resistance, Junction-to-ambient, max | R <sub>θJA</sub> | 40 (Note ) |      |

Note : Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board, pulse width≤10s.

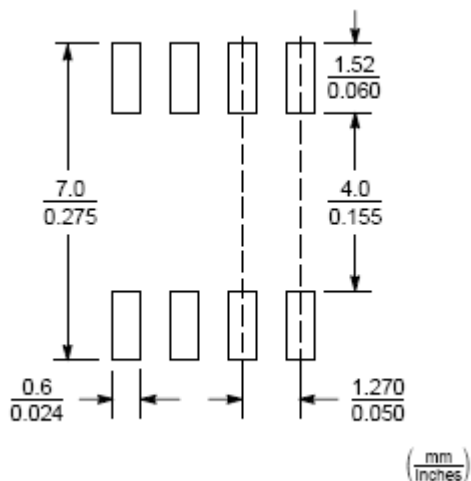
**Electrical Characteristics (Tj=25°C, unless otherwise specified)**

| 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>  | -0.8 | -    | -1.6 |      | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                              |
| I <sub>GSS</sub>     | -    | -    | ±100 | nA   | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   |
| I <sub>DSS</sub>     | -    | -    | -1   | μA   | V <sub>DS</sub> =-24V, 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> | -    | 10   | 13   | mΩ   | V <sub>GS</sub> =-10V, I <sub>D</sub> =-12A  |
|                      | -    | 13.2 | 18   |      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A   |
|                      | -    | 23.5 | 47   |      | V <sub>GS</sub> =-3V, I <sub>D</sub> =-5A  |
| *G <sub>FS</sub>     | -    | 24   | -    | S    | V <sub>DS</sub> =-5V, I <sub>D</sub> =-10A   |
| <b>Dynamic</b>       |      |      |      |      |  |
| C <sub>iss</sub>     | -    | 2343 | -    | pF   | V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1MHz                                     |
| C <sub>oss</sub>     | -    | 238  | -    |      |  |
| C <sub>rss</sub>     | -    | 198  | -    |      |  |
| *t <sub>d(ON)</sub>  | -    | 11   | -    | ns   | V <sub>DD</sub> =-15V, I <sub>D</sub> =-12A, V <sub>GS</sub> =-10V, R <sub>G</sub> =1Ω |
| *t <sub>r</sub>      | -    | 9    | -    |      |  |
| *t <sub>d(OFF)</sub> | -    | 73.8 | -    |      |  |
| *t <sub>f</sub>      | -    | 12.8 | -    |      |  |

|                           |   |       |      |    |  |
|---------------------------|---|-------|------|----|--|
| *Qg                       | - | 51.4  | -    | nC | V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-12A |
| *Qgs                      | - | 5.9   | -    |    |  |
| *Qgd                      | - | 10.7  | -    |    |  |
| <b>Source Drain Diode</b> |   |       |      |    |  |
| *V <sub>SD</sub>          | - | -0.75 | -1.2 | V  | V <sub>GS</sub> =0V, I <sub>S</sub> =-2.1A                         |
| trr                       | - | 19.2  | -    | ns | I <sub>F</sub> =-2.1A, dI <sub>F</sub> /dt=100A/μs                 |
| Qrr                       | - | 8.4   | -    | nC |  |

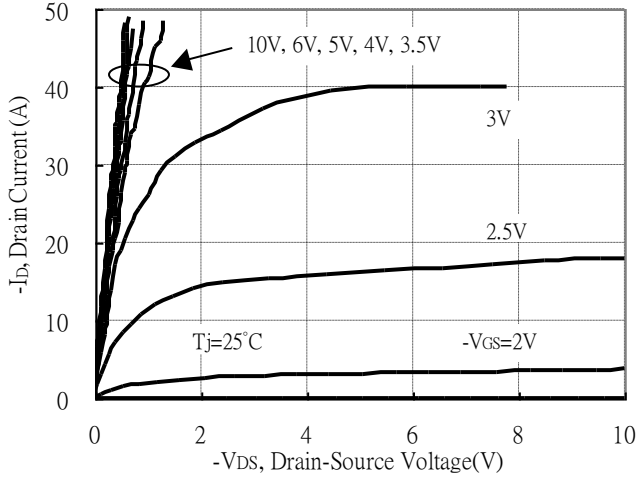
\*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

### Recommended Soldering Footprint

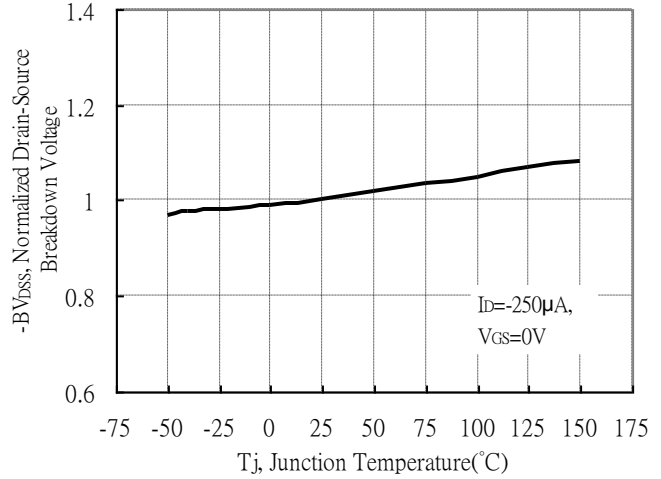


## Typical Characteristics

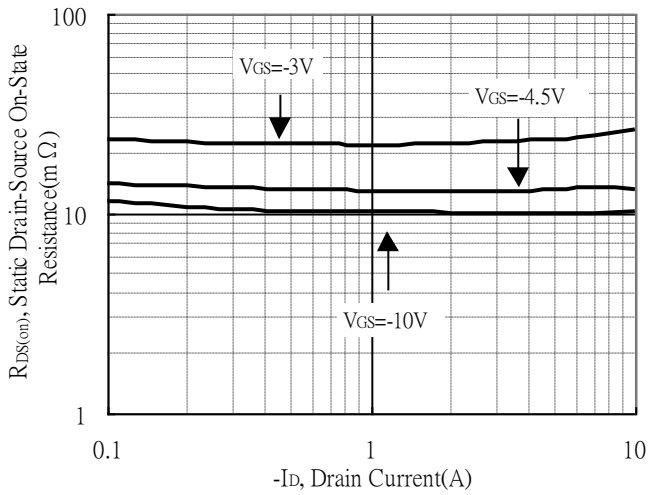
Typical Output Characteristics



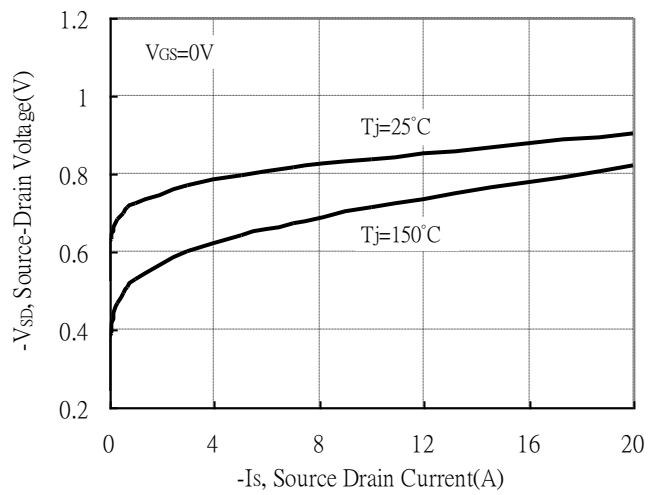
Normalized Brekdown Voltage vs Ambient Temperature



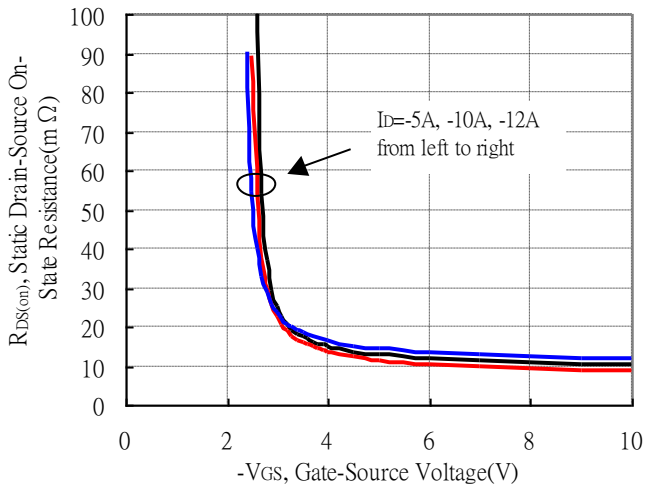
Static Drain-Source On-State resistance vs Drain Current



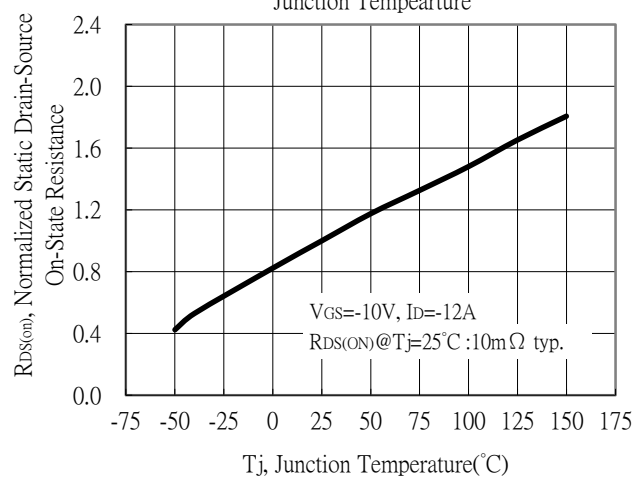
Source Drain Current vs Source-Drain Voltage



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

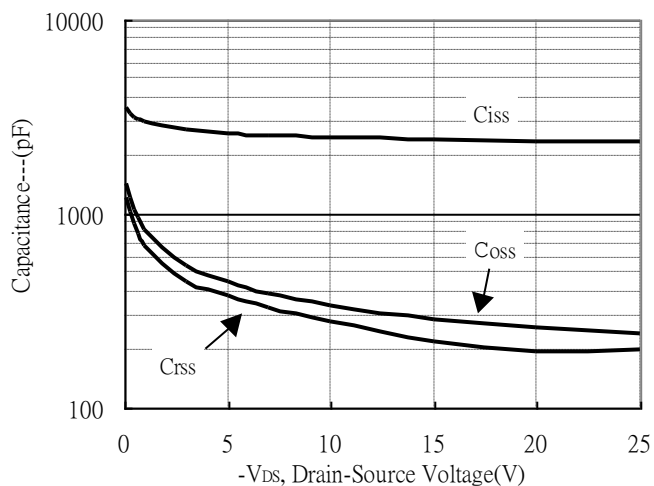


Normalized Drain-Source On-State Resistance vs Junction Temperature

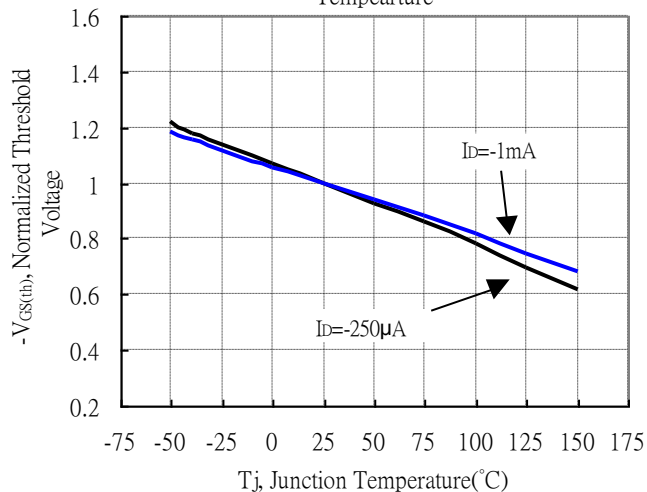


**Typical Characteristics(Cont.)**

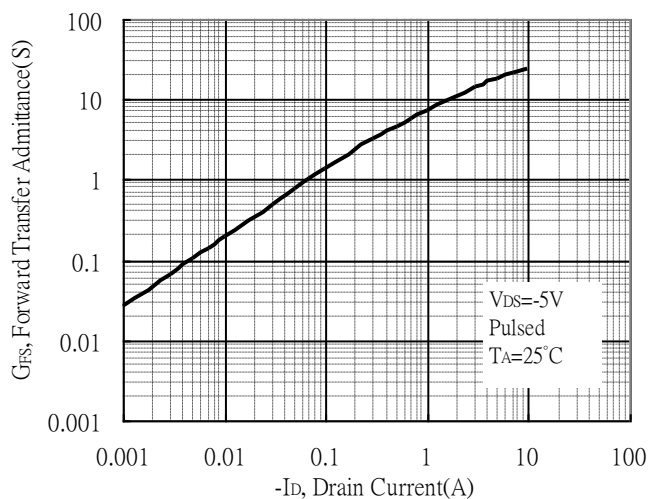
Capacitance vs Drain-to-Source Voltage



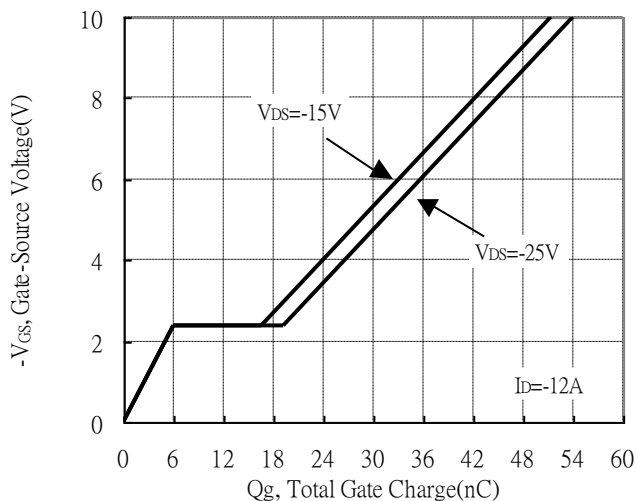
Normalized Threshold Voltage vs Junction Temperature



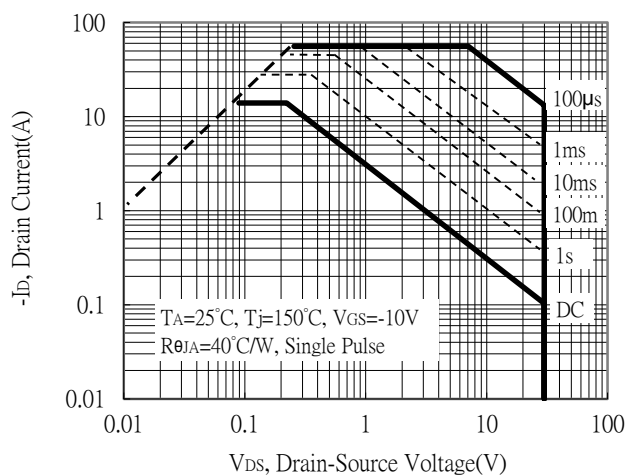
Forward Transfer Admittance vs Drain Current



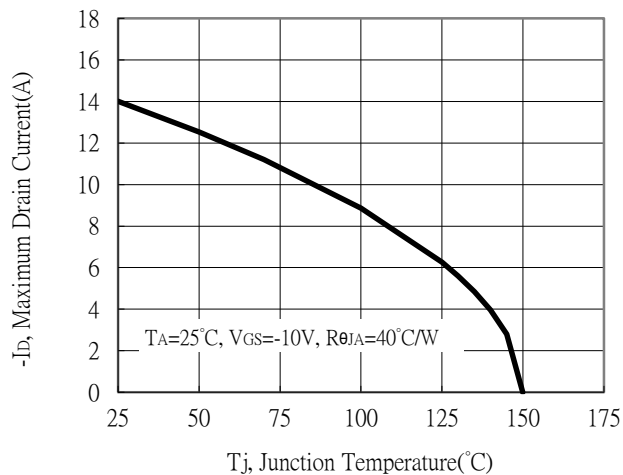
Gate Charge Characteristics



Maximum Safe Operating Area

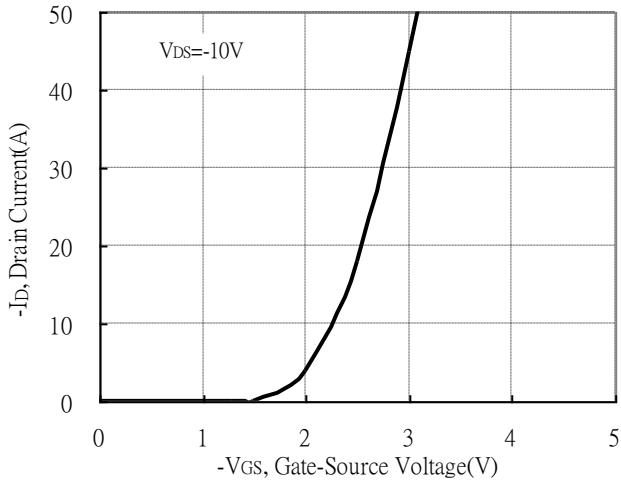


Maximum Drain Current vs Junction Temperature

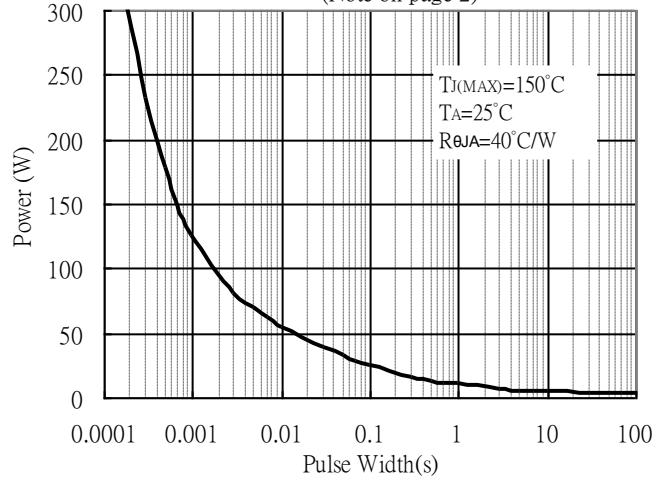


**Typical Characteristics(Cont.)**

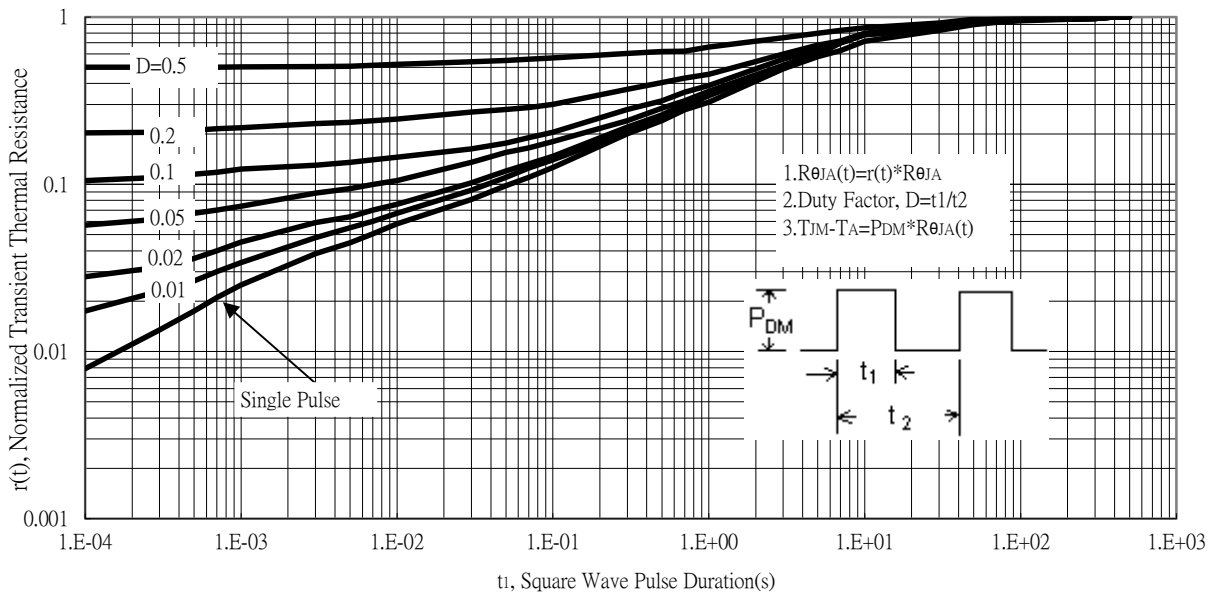
Typical Transfer Characteristics



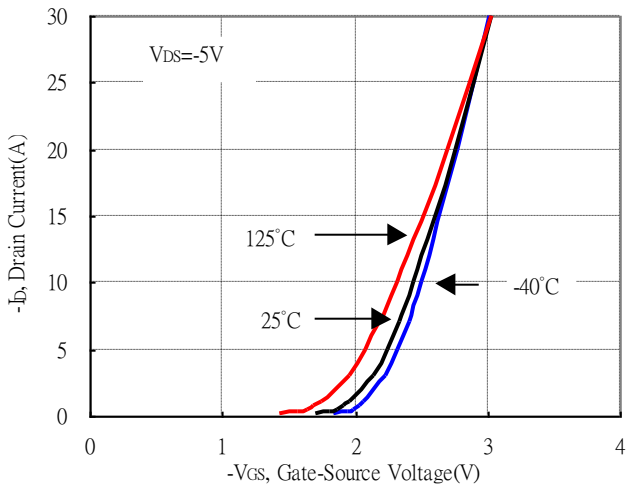
Single Pulse Power Rating, Junction to Ambient  
 (Note on page 2)



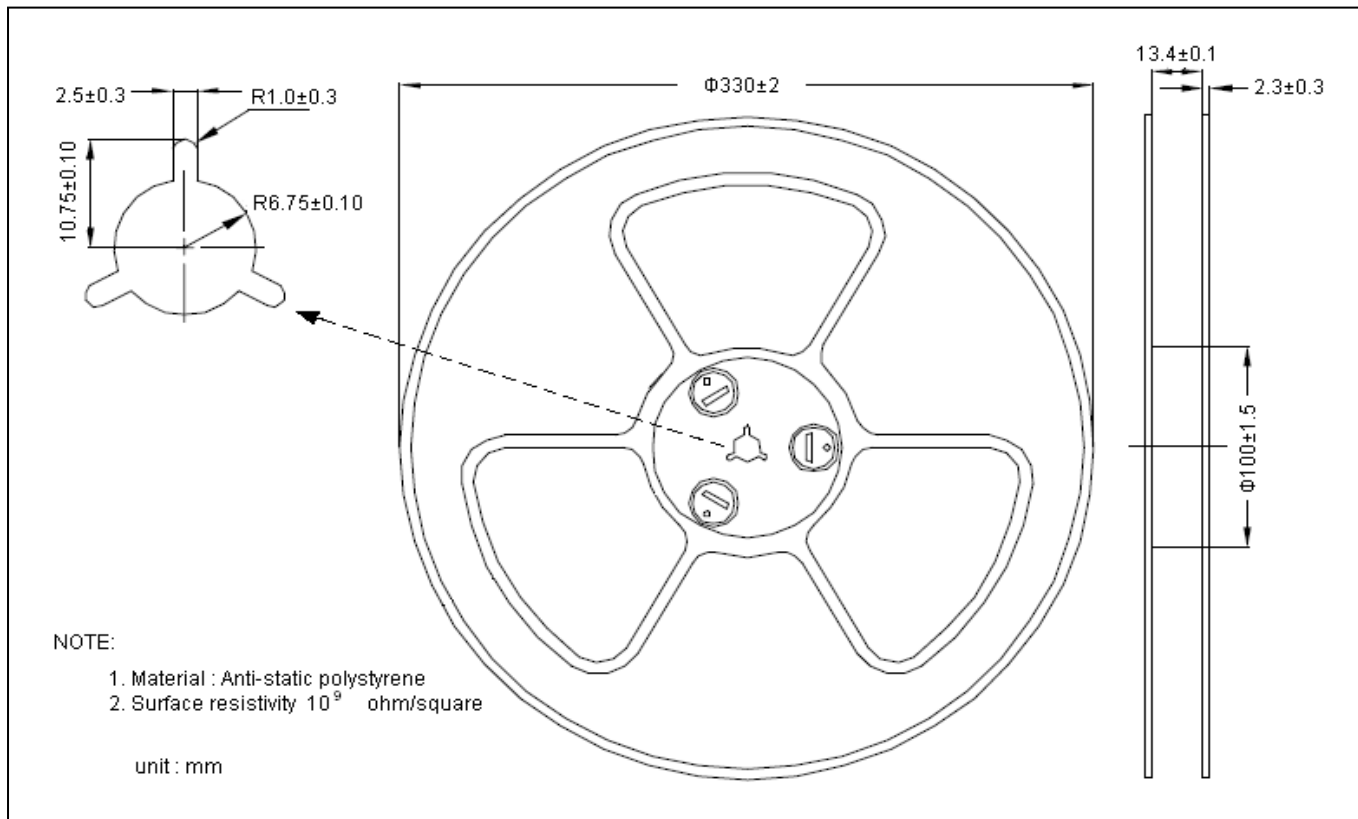
Transient Thermal Response Curves



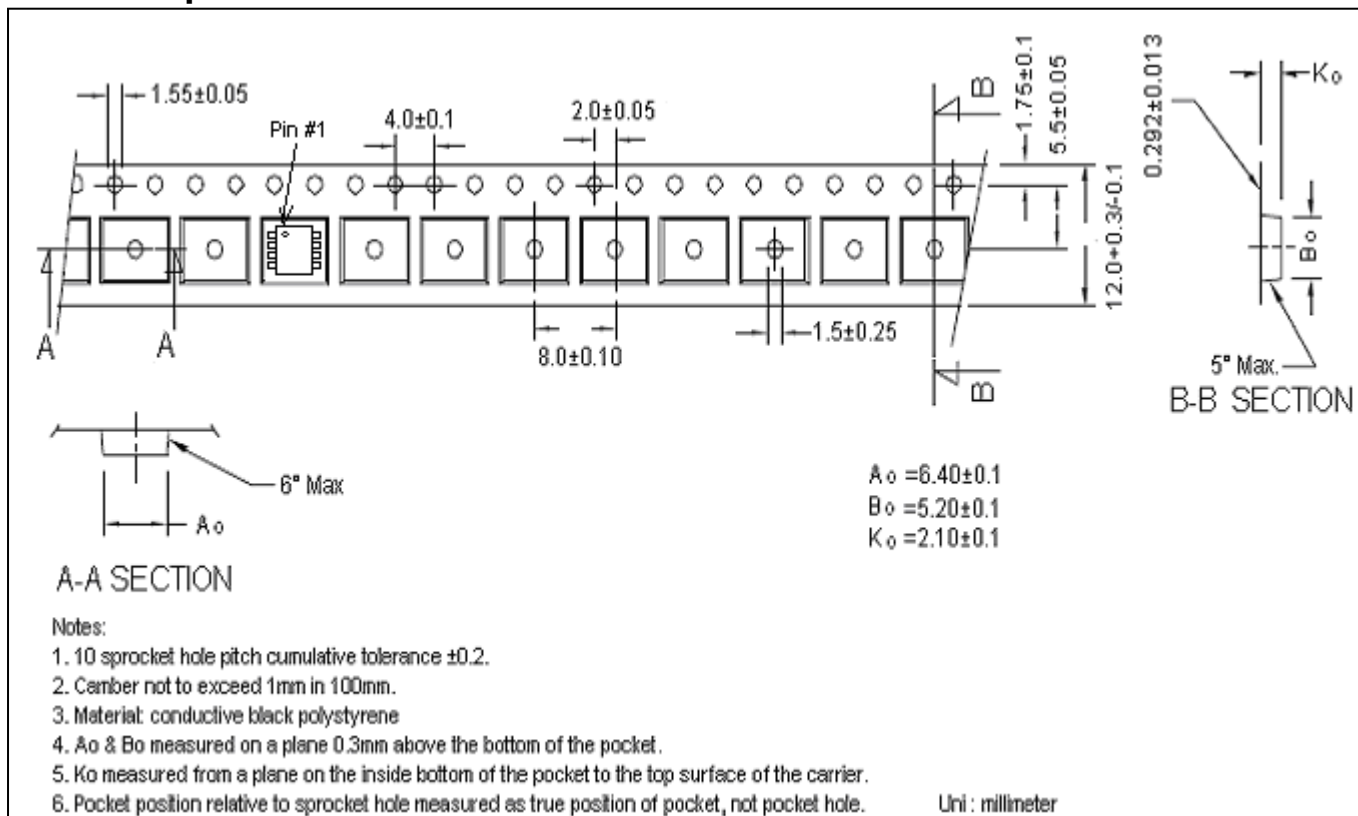
Typical Transfer Characteristics



### Reel Dimension

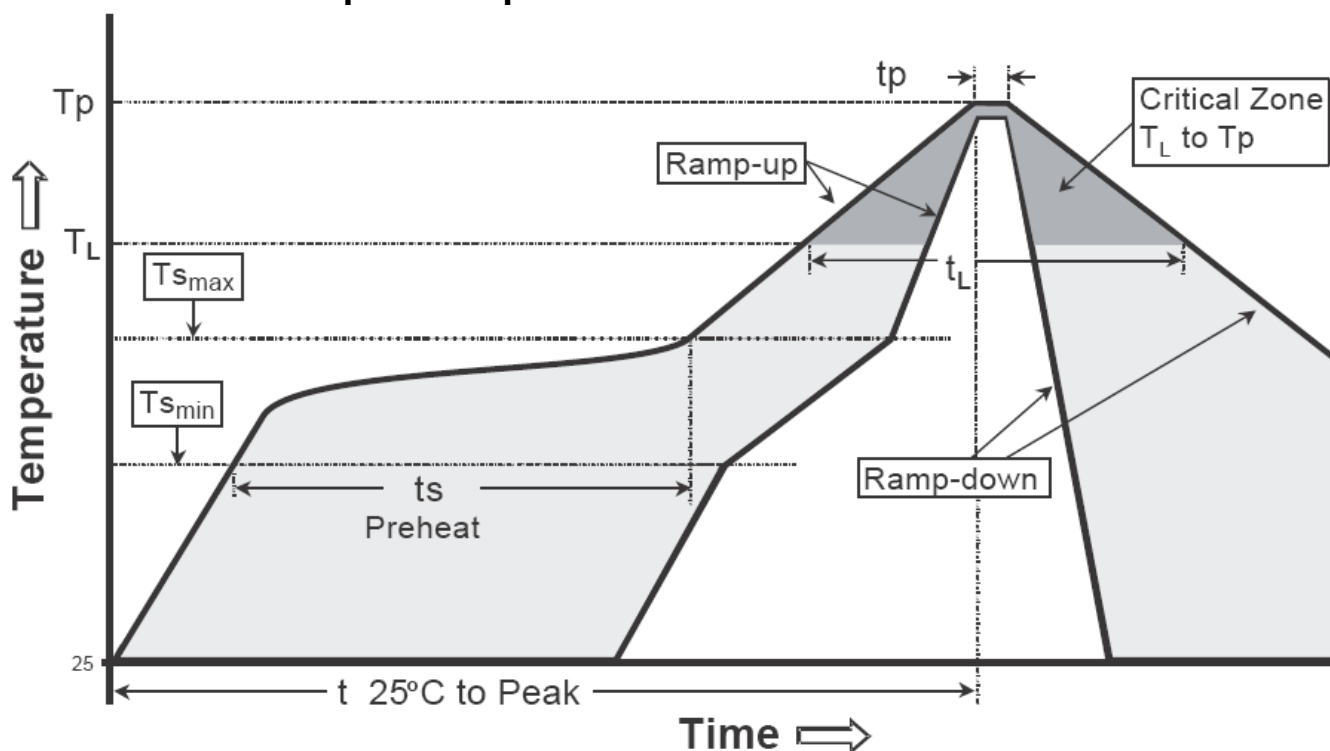


### Carrier Tape Dimension



**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**


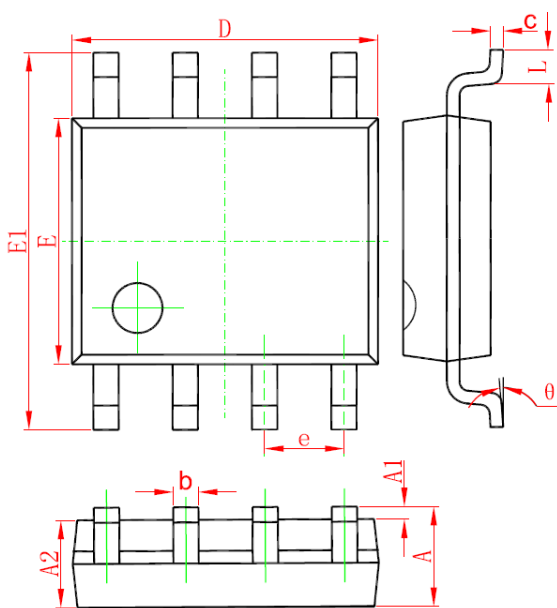
| Profile feature   | Sn-Pb eutectic Assembly | Pb-free Assembly |
|---|-------------------------|------------------|
| Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> ) | 3°C/second max.         | 3°C/second max.  |
| Preheat   |                         |                  |
| -Temperature 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(t <sub>p</sub> ) | 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.

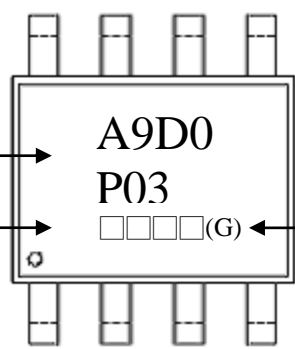


**SOP-8 Dimension**



The diagram shows three views of an 8-lead SOP-8 package: a top view with dimensions D, E, E1, and e; a side view with dimensions L, C, and  $\theta$ ; and a bottom view with dimensions A, A1, A2, and b.

**Marking:**



The marking diagram shows the top of the package with the following markings: "A9D0" (Device Code), "P03" (Date Code), and four squares followed by "(G)" (Assembly site code).

Device Code → A9D0  
 Date Code → P03  
 Assembly site code → □□□□(G)

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→ JCET, G →GEM

**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 | $\theta$ | 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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