

**N-Channel Enhancement Mode Power MOSFET**

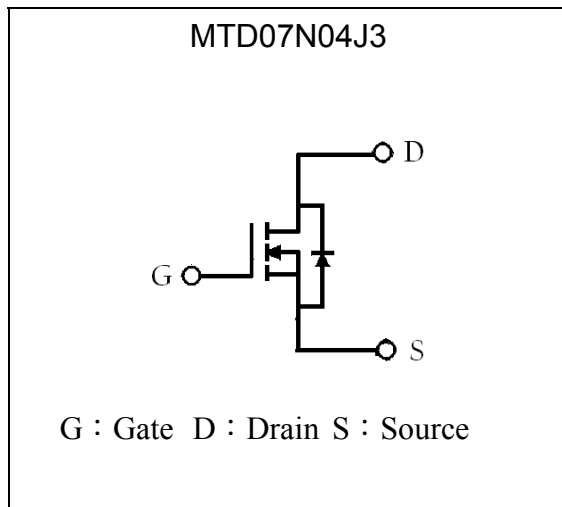
# MTD07N04J3

|  |                     |
|--|---------------------|
| <b>BV<sub>DSS</sub></b>  | <b>40V</b>          |
| <b>I<sub>D</sub>@V<sub>GS</sub>=10V, T<sub>C</sub>=25°C</b>      | <b>50A</b>          |
| <b>R<sub>DS(ON)</sub>@V<sub>GS</sub>=10V, I<sub>D</sub>=20A</b>  | <b>6.3 mΩ (typ)</b> |
| <b>R<sub>DS(ON)</sub>@V<sub>GS</sub>=4.5V, I<sub>D</sub>=10A</b> | <b>8.4 mΩ (typ)</b> |

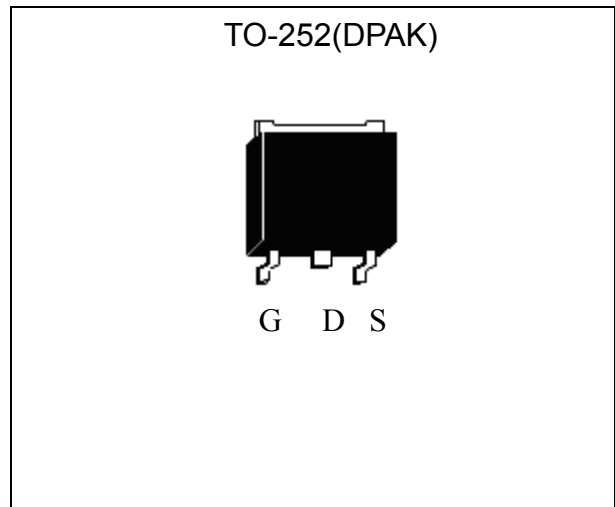
**Features**

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

**Symbol**

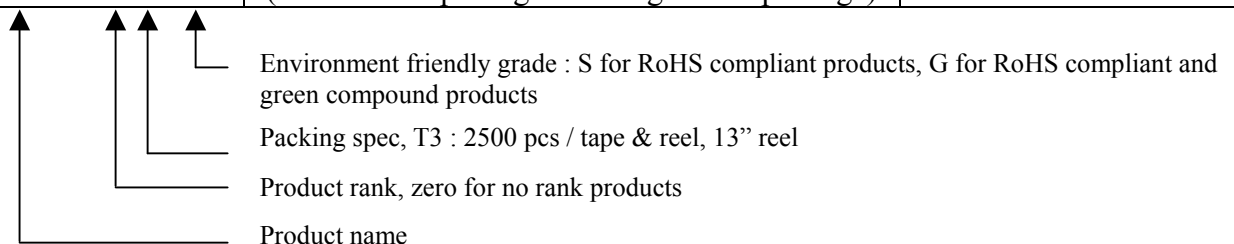


**Outline**



**Ordering Information**

| Device            | Package   | Shipping              |
|-------------------|---|-----------------------|
| MTD07N04J3-0-T3-G | TO-252<br>(Pb-free lead plating and halogen-free package) | 2500 pcs / tape& reel |



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

| Parameter   | Symbol         | Limits                             | Unit               |   |
|---|----------------|------------------------------------|--------------------|---|
| Drain-Source Voltage (Note 1)   | $V_{DS}$       | 40                                 | V                  |   |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$                           |                    |   |
| Continuous Drain Current @ $T_C=25^{\circ}\text{C}$ , $V_{GS}=10\text{V}$ (silicon limit) (Note 1)  | $I_D$          | 63                                 | A                  |   |
| Continuous Drain Current @ $T_C=100^{\circ}\text{C}$ , $V_{GS}=10\text{V}$ (silicon limit) (Note 1) |                | 40                                 |                    |   |
| Continuous Drain Current @ $T_C=25^{\circ}\text{C}$ , $V_{GS}=10\text{V}$ (package limit) (Note 1)  |                | 50                                 |                    |   |
| Continuous Drain Current @ $T_A=25^{\circ}\text{C}$ , $V_{GS}=10\text{V}$ (Note 2)                  | $I_{DSM}$      | 13.5                               |                    |   |
| Continuous Drain Current @ $T_A=70^{\circ}\text{C}$ , $V_{GS}=10\text{V}$ (Note 2)                  |                | 10.8                               |                    |   |
| Pulsed Drain Current @ $V_{GS}=10\text{V}$ (Note 3)   | $I_{DM}$       | 200                                |                    |   |
| Avalanche Current (Note 3)  | $I_{AS}$       | 18                                 |                    |   |
| Single Pulse Avalanche Energy @ $L=0.5\text{mH}$ , $I_D=18\text{A}$ , $V_{DD}=25\text{V}$           | $E_{AS}$       | 81                                 | mJ                 |   |
| Power Dissipation   | $P_D$          | $T_C=25^{\circ}\text{C}$ (Note 1)  | 54                 | W |
|   |                | $T_C=100^{\circ}\text{C}$ (Note 1) | 21                 |   |
|   | $P_{DSM}$      | $T_A=25^{\circ}\text{C}$ (Note 2)  | 2.5                |   |
|   |                | $T_A=70^{\circ}\text{C}$ (Note 2)  | 1.6                |   |
| Operating Junction and Storage Temperature  | $T_j, T_{stg}$ | -55~+150                           | $^{\circ}\text{C}$ |   |

**Thermal Data**

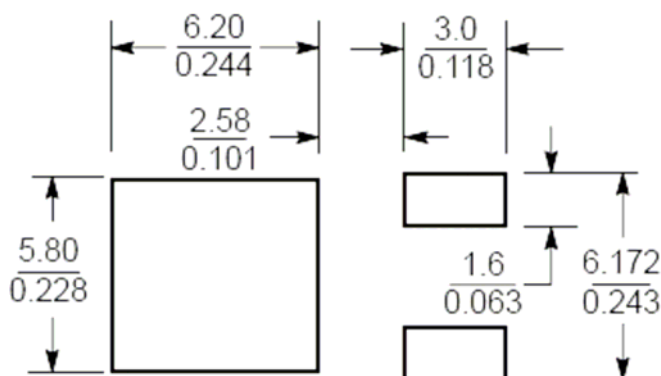
| Parameter   | Symbol          | Value | Unit                        |
|---|-----------------|-------|-----------------------------|
| Thermal Resistance, Junction-to-case, max             | $R_{\theta JC}$ | 2.3   | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-ambient, max (Note 2) | $R_{\theta JA}$ | 50    |                             |

- Note : 1. The power dissipation  $P_D$  is based on  $T_{J(MAX)}=150^{\circ}\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2 oz. copper, in a still air environment with  $T_A=25^{\circ}\text{C}$ . The power dissipation  $P_{DSM}$  is based on  $R_{\theta JA}$  and the maximum allowed junction temperature of  $150^{\circ}\text{C}$ .
3. Pulse width limited by junction temperature  $T_{J(MAX)}=150^{\circ}\text{C}$ . Ratings are based on low frequency and low duty cycles to keep initial  $T_j=25^{\circ}\text{C}$ .

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

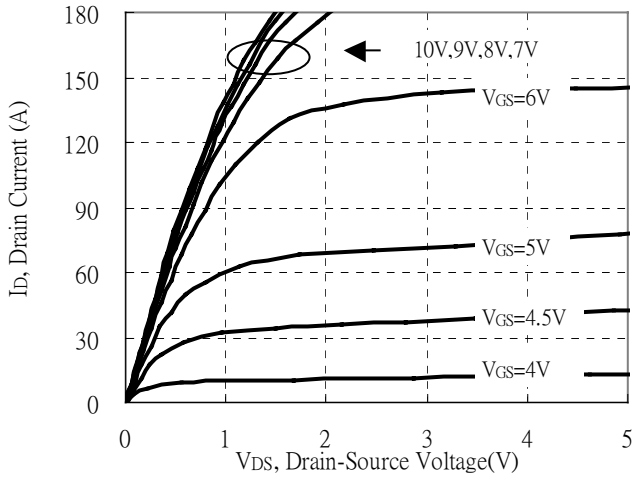
| Symbol                                  | Min. | Typ. | Max. | Unit | Test Conditions  |
|---|------|------|------|------|--|
| <b>Static</b>                           |      |      |      |      |  |
| BV <sub>DSS</sub>                       | 40   | -    | -    | V    | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA   |
| ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>     | -    | 0.03 | -    | V/°C | Reference to 25°C, I <sub>D</sub> =250μA   |
| V <sub>GS(th)</sub>                     | 1.5  | -    | 2.5  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                          |
| *G <sub>FS</sub>                        | -    | 22   | -    | S    | V <sub>DS</sub> = 5V, I <sub>D</sub> =10A  |
| I <sub>GSS</sub>                        | -    | -    | ±100 | nA   | V <sub>GS</sub> =±20V  |
| I <sub>DSS</sub>                        | -    | -    | 1    | μA   | V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V  |
|   | -    | -    | 10   |      | V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V, T <sub>j</sub> =85°C                  |
| *R <sub>DS(ON)</sub>                    | -    | 6.3  | 7.6  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> =20A   |
|   | -    | 8.4  | 10   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =10A  |
| <b>Dynamic</b>                          |      |      |      |      |  |
| *Q <sub>g</sub> (V <sub>GS</sub> =10V)  | -    | 31   | 46.5 | nC   | V <sub>DD</sub> =20V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V                    |
| *Q <sub>g</sub> (V <sub>GS</sub> =4.5V) | -    | 15.7 | -    |      |  |
| *Q <sub>gs</sub>                        | -    | 6    | -    |      |  |
| *Q <sub>gd</sub>                        | -    | 7    | -    |      |  |
| *t <sub>d(ON)</sub>                     | -    | 14.6 | -    | ns   | V <sub>DD</sub> =20V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V, R <sub>G</sub> =1Ω |
| *t <sub>r</sub>                         | -    | 18.8 | -    |      |  |
| *t <sub>d(OFF)</sub>                    | -    | 43.4 | -    |      |  |
| *t <sub>f</sub>                         | -    | 8    | -    |      |  |
| C <sub>iss</sub>                        | -    | 1517 | -    | pF   | V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, f=1MHz                                  |
| C <sub>oss</sub>                        | -    | 188  | -    |      |  |
| C <sub>rss</sub>                        | -    | 116  | -    |      |  |
| R <sub>g</sub>                          | -    | 1.6  | -    | Ω    | f=1MHz   |
| <b>Source-Drain Diode</b>               |      |      |      |      |  |
| *I <sub>S</sub>                         | -    | -    | 50   | A    |  |
| *V <sub>SD</sub>                        | -    | 0.86 | 1.1  | V    | I <sub>S</sub> =20A, V <sub>GS</sub> =0V   |
| *t <sub>rr</sub>                        | -    | 14   | -    | ns   | V <sub>GS</sub> =0, I <sub>F</sub> =20A, dI <sub>F</sub> /dt=360A/μs               |
| *Q <sub>rr</sub>                        | -    | 8.6  | -    | nC   |  |

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

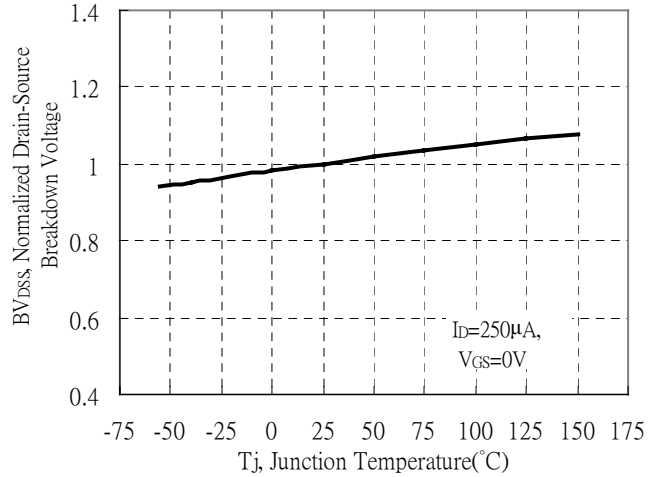
**Recommended soldering footprint**

 Unit (  $\frac{\text{mm}}{\text{inch}}$  )

**Typical Characteristics**

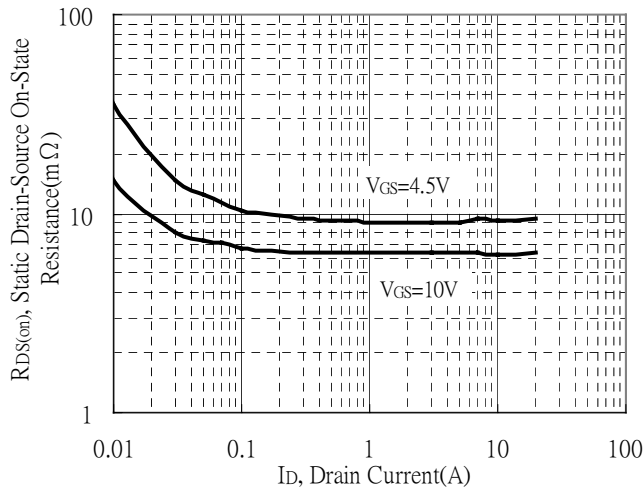
Typical Output Characteristics



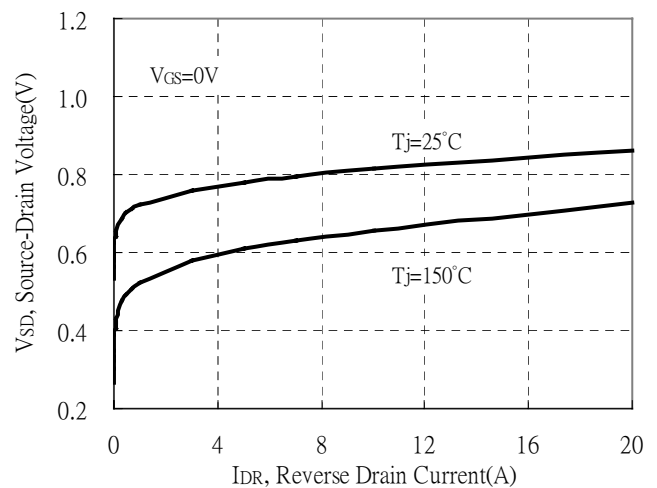
Brekdown Voltage vs Ambient Temperature



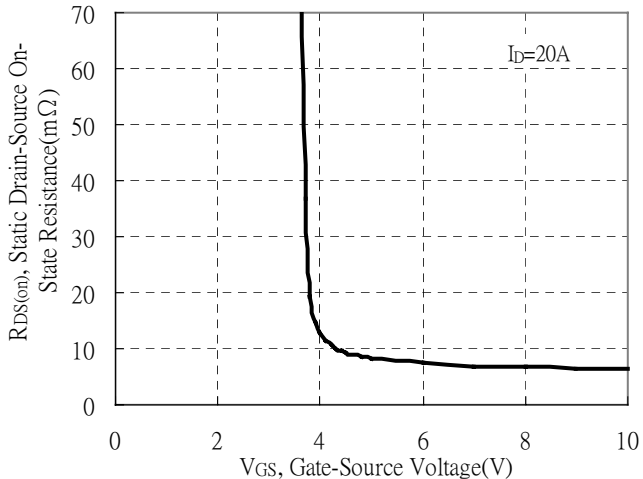
Static Drain-Source On-State resistance vs Drain Current



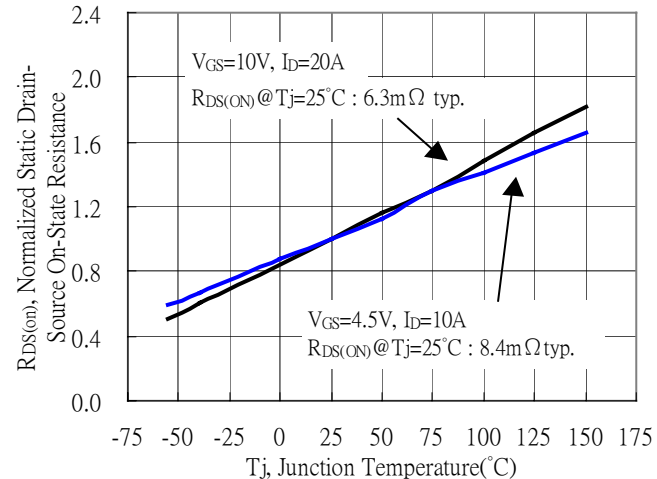
Reverse Drain Current vs Source-Drain Voltage



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



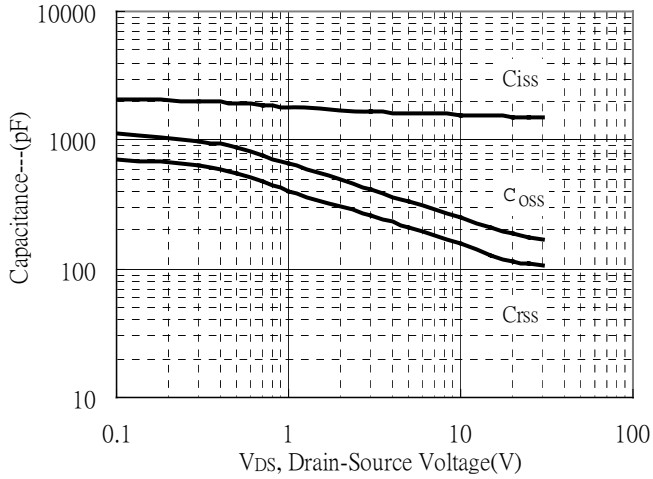
Drain-Source On-State Resistance vs Junction Temperature



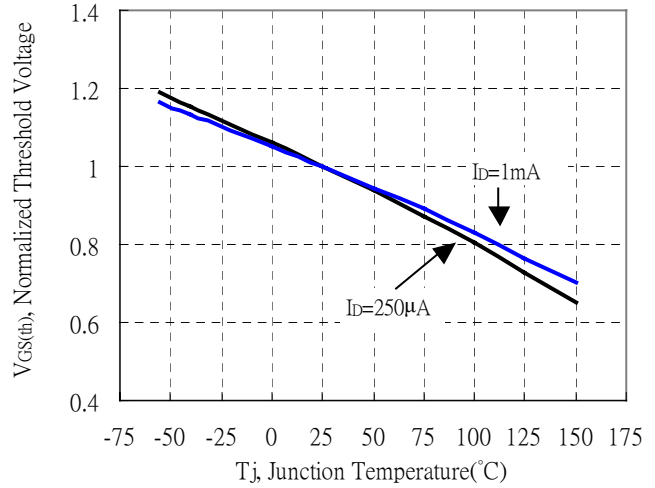


**Typical Characteristics(Cont.)**

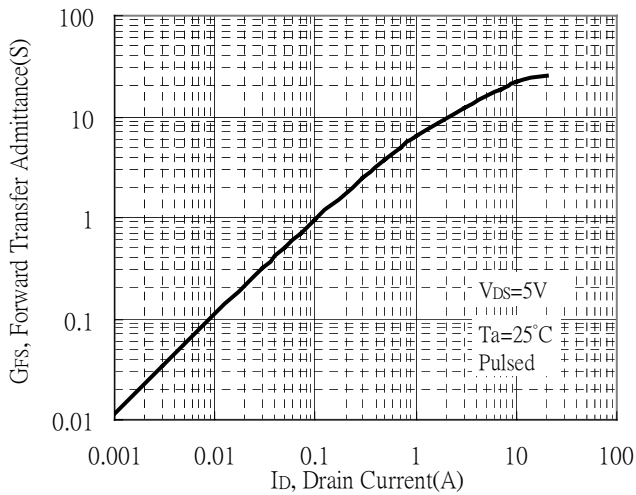
Capacitance vs Drain-to-Source Voltage



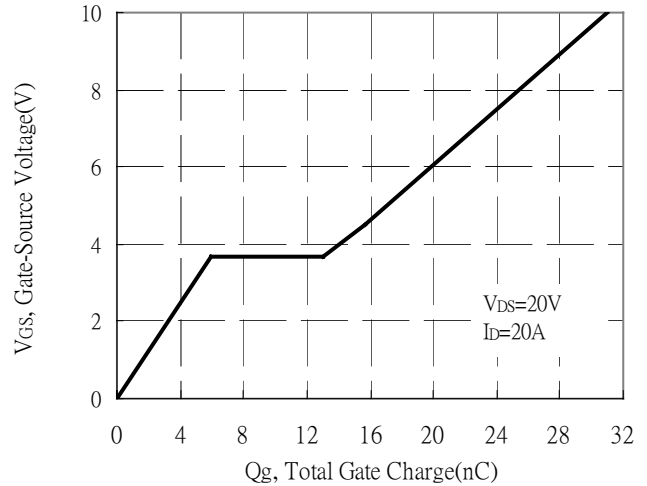
Threshold Voltage vs Junction Temperature



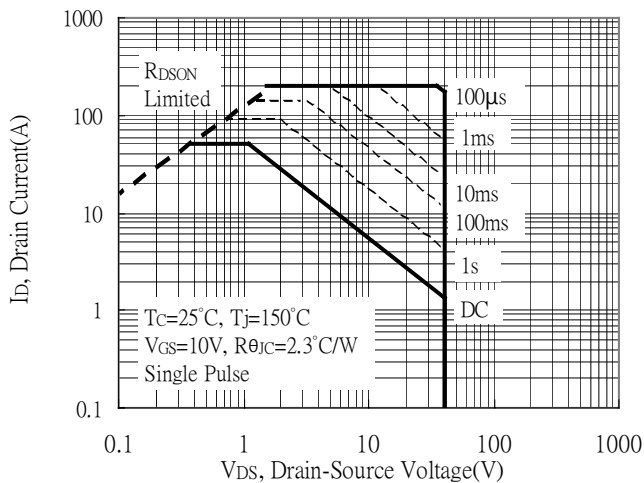
Forward Transfer Admittance vs Drain Current



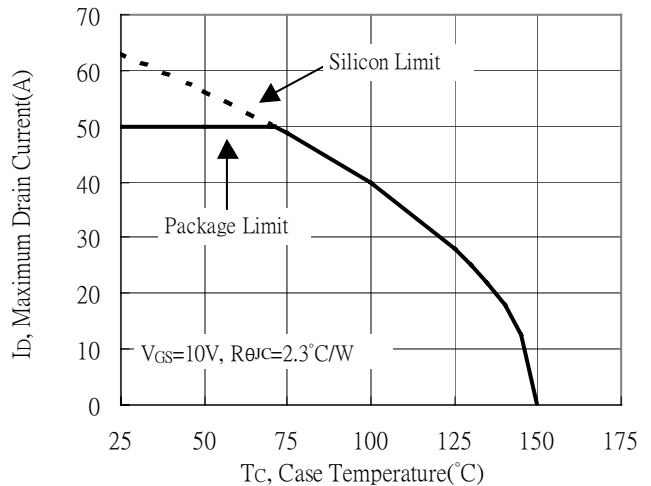
Gate Charge Characteristics



Maximum Safe Operating Area



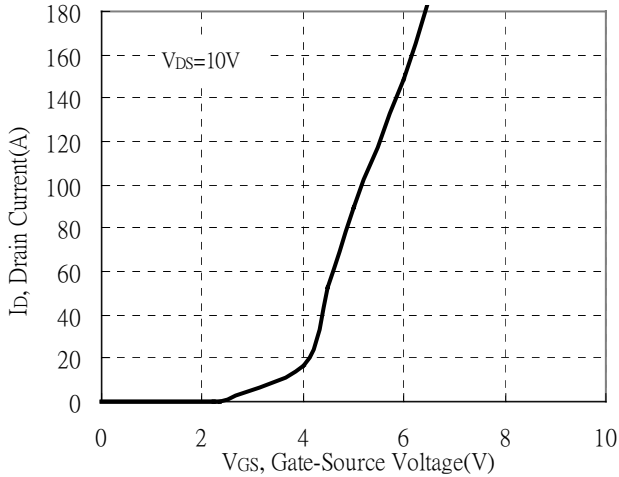
Maximum Drain Current vs Case Temperature



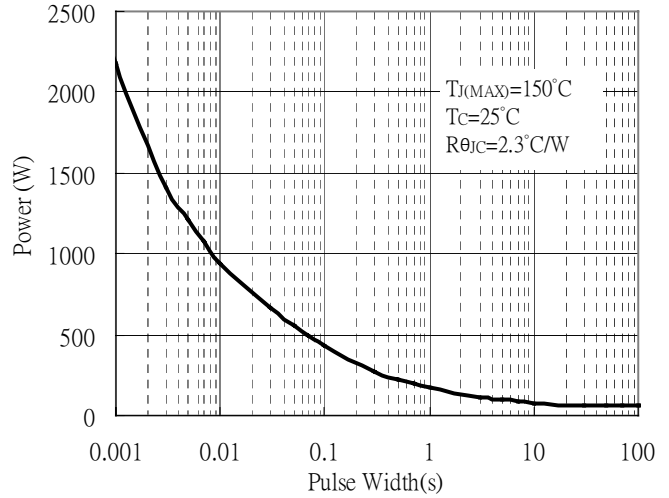


**Typical Characteristics(Cont.)**

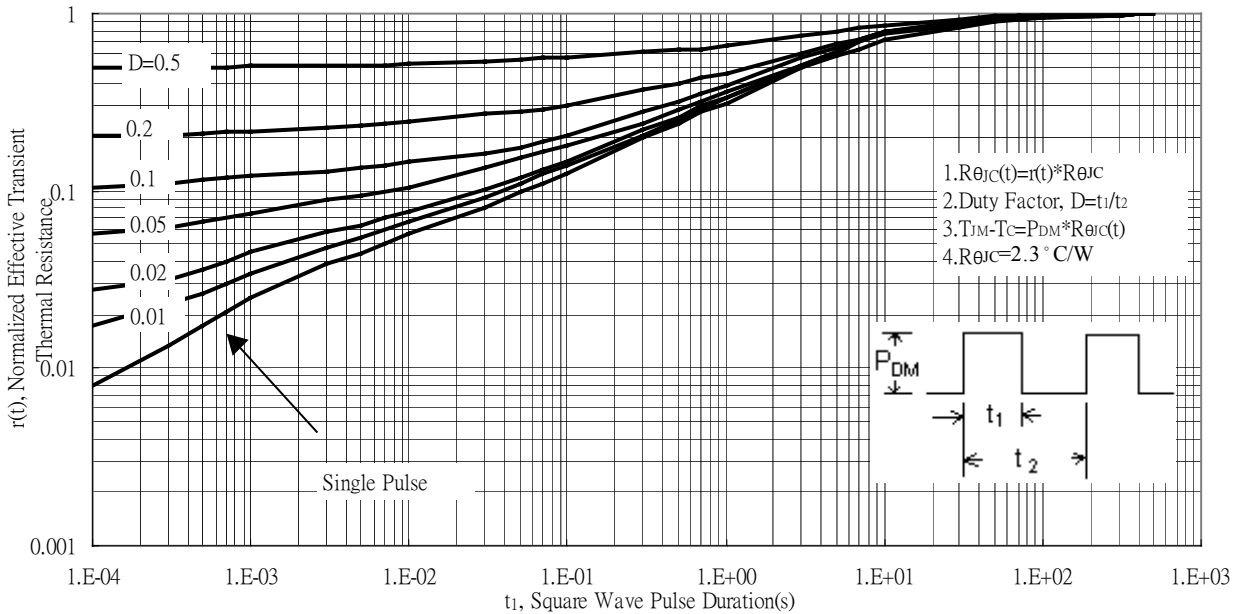
Typical Transfer Characteristics



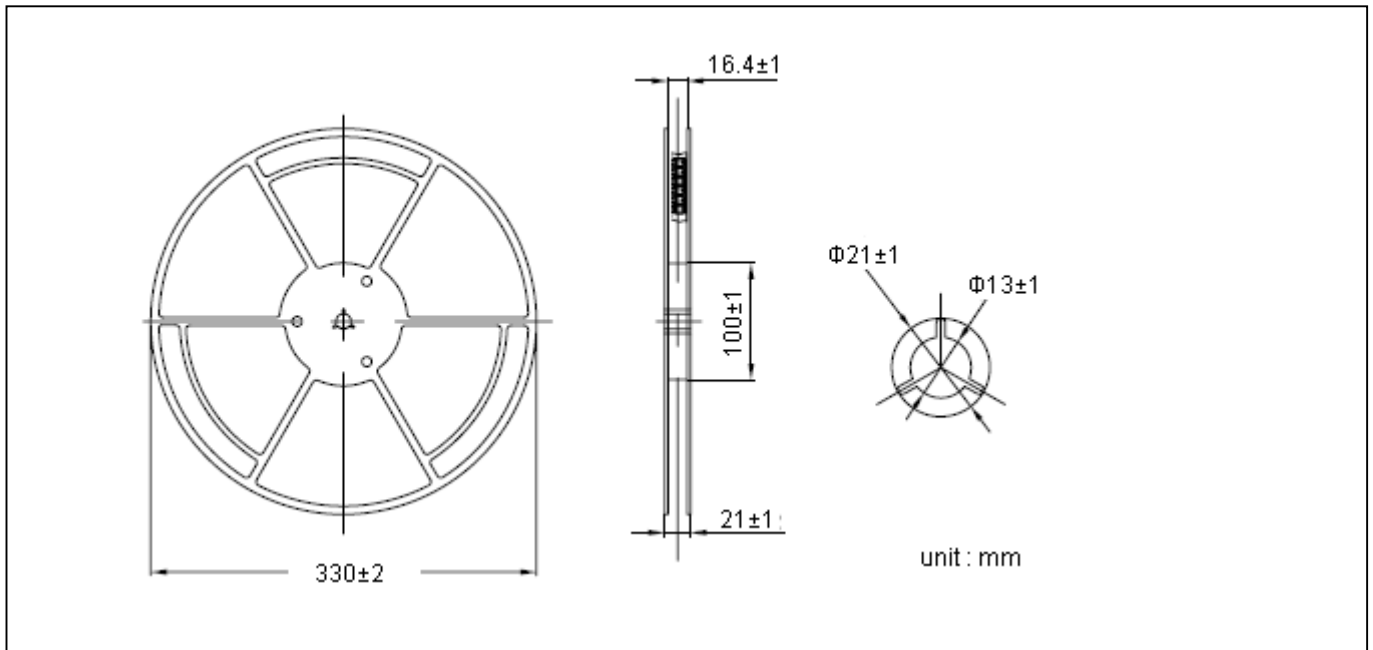
Single Pulse Power Rating, Junction to Case



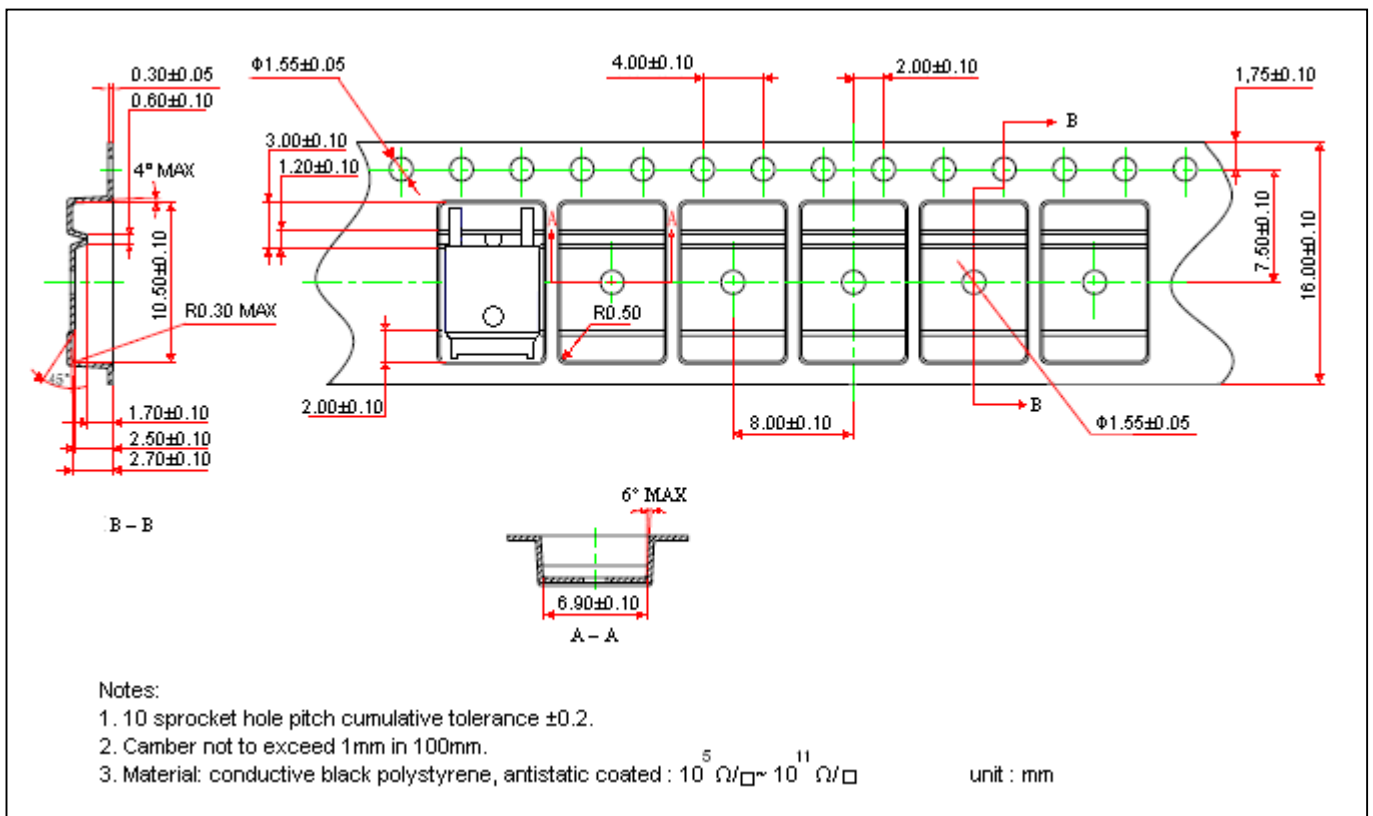
Transient Thermal Response Curves



**Reel Dimension**

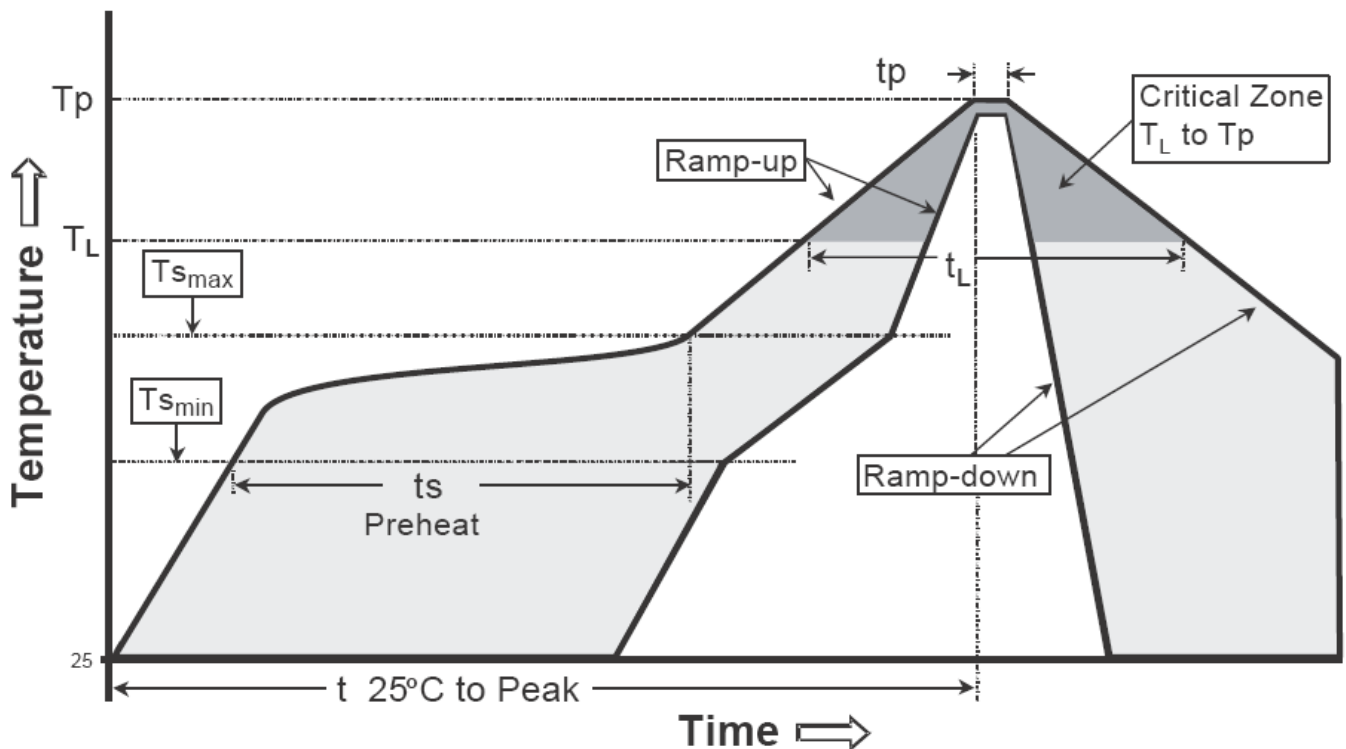


**Carrier Tape Dimension**



**Recommended wave soldering condition**

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

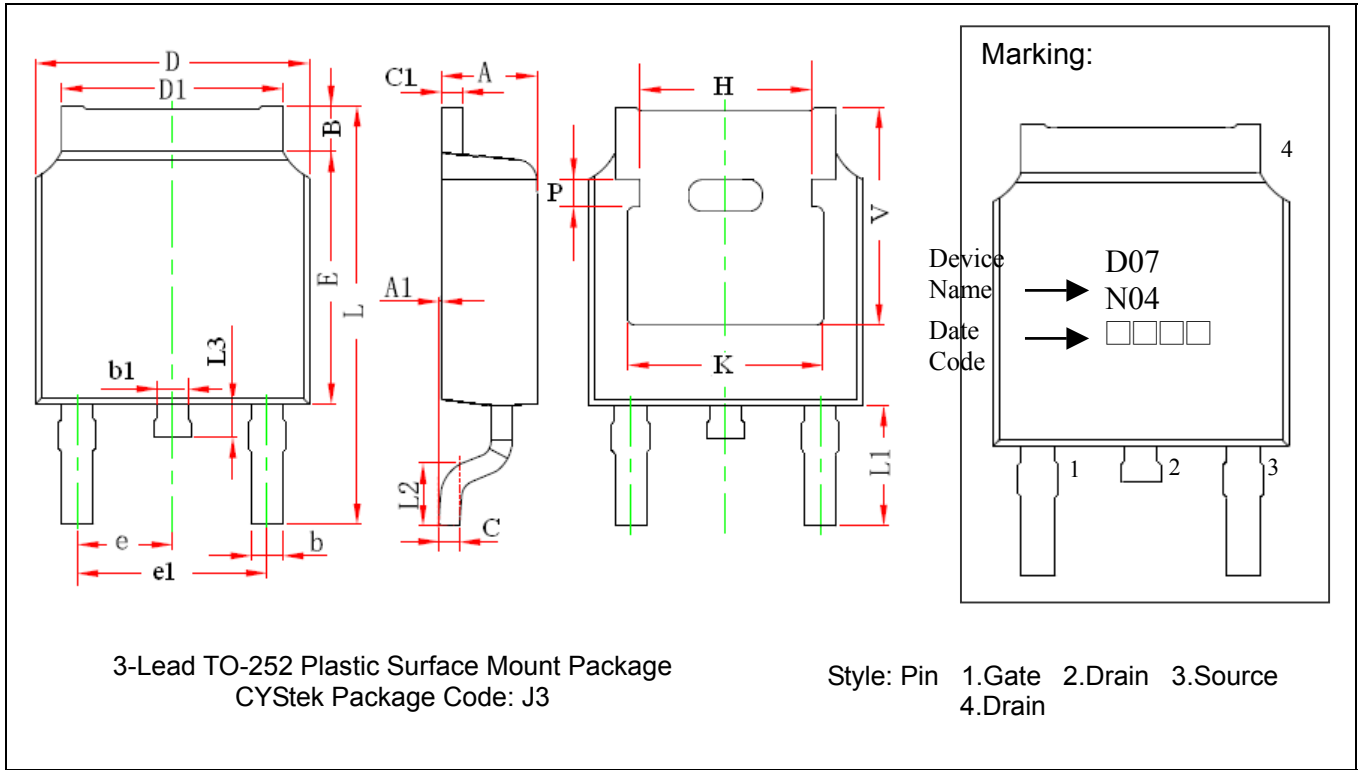
**Recommended temperature profile for IR reflow**


| 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.



**TO-252 Dimension**



| DIM | Inches |       | Millimeters |       | DIM | Inches |       | Millimeters |        |
|-----|--------|-------|-------------|-------|-----|--------|-------|-------------|--------|
|     | Min.   | Max.  | Min.        | Max.  |     | Min.   | Max.  | Min.        | Max.   |
| A   | 0.087  | 0.094 | 2.200       | 2.400 | e   | 0.086  | 0.094 | 2.186       | 2.386  |
| A1  | 0.000  | 0.005 | 0.000       | 0.127 | e1  | 0.172  | 0.188 | 4.372       | 4.772  |
| B   | 0.039  | 0.048 | 0.990       | 1.210 | H   | 0.163  | REF   | 4.140       | REF    |
| b   | 0.026  | 0.034 | 0.660       | 0.860 | K   | 0.190  | REF   | 4.830       | REF    |
| b1  | 0.026  | 0.034 | 0.660       | 0.860 | L   | 0.386  | 0.409 | 9.800       | 10.400 |
| C   | 0.018  | 0.023 | 0.460       | 0.580 | L1  | 0.114  | REF   | 2.900       | REF    |
| C1  | 0.018  | 0.023 | 0.460       | 0.580 | L2  | 0.055  | 0.067 | 1.400       | 1.700  |
| D   | 0.256  | 0.264 | 6.500       | 6.700 | L3  | 0.024  | 0.039 | 0.600       | 1.000  |
| D1  | 0.201  | 0.215 | 5.100       | 5.460 | P   | 0.026  | REF   | 0.650       | REF    |
| E   | 0.236  | 0.244 | 6.000       | 6.200 | V   | 0.211  | REF   | 5.350       | REF    |

- Notes:**
- Controlling dimension: millimeters.
  - Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
  - 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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