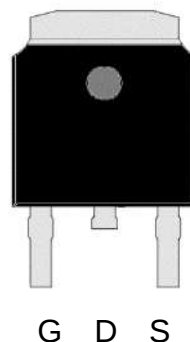


## N-Channel Enhancement Mode Power MOSFET

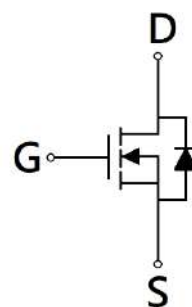
### Features:

- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic

TO-252



|                                          |              |
|------------------------------------------|--------------|
| $BV_{DSS}$                               | 150V         |
| $I_D @ V_{GS}=10V, T_C=25^\circ C$       | 23A          |
| $I_D @ V_{GS}=10V, T_A=25^\circ C$       | 6A           |
| $R_{DS(ON)}$ typ. @ $V_{GS}=10V, I_D=6A$ | 38m $\Omega$ |



G : Gate S : Source D : Drain

### Ordering Information

| Device     | Package                                                     | Shipping               |
|------------|-------------------------------------------------------------|------------------------|
| KJE040N15R | TO-252<br>(Pb-free lead plating and RoHS compliant package) | 2500 pcs / Tape & Reel |

## Absolute Maximum Ratings (T<sub>A</sub>=25°C)

| Parameter                                                              |                       | Symbol                            | Limits   | Unit |
|------------------------------------------------------------------------|-----------------------|-----------------------------------|----------|------|
| Drain-Source Voltage                                                   |                       | V <sub>DS</sub>                   | 150      | V    |
| Gate-Source Voltage                                                    |                       | V <sub>GS</sub>                   | ±20      |      |
| Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =25°C  |                       | I <sub>D</sub>                    | 23       | A    |
| Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =100°C |                       |                                   | 15       |      |
| Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>A</sub> =25°C  |                       |                                   | 6        |      |
| Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>A</sub> =70°C  |                       |                                   | 5        |      |
| Pulsed Drain Current                                                   |                       | I <sub>DM</sub>                   | 92       |      |
| Continuous Body Diode Forward Current @ T <sub>C</sub> =25°C           |                       | I <sub>S</sub>                    | 23       |      |
| Avalanche Current @ L=0.1mH                                            |                       | I <sub>AS</sub>                   | 10       |      |
| Avalanche Energy @ L=0.5mH                                             |                       | E <sub>AS</sub>                   | 9        | mJ   |
| Total Power Dissipation                                                | T <sub>C</sub> =25°C  | P <sub>D</sub>                    | 57       | W    |
|                                                                        | T <sub>C</sub> =100°C |                                   | 23       |      |
|                                                                        | T <sub>A</sub> =25°C  |                                   | 3.6      |      |
|                                                                        | T <sub>A</sub> =70°C  |                                   | 2.3      |      |
| Operating Junction and Storage Temperature Range                       |                       | T <sub>J</sub> , T <sub>stg</sub> | -55~+150 | °C   |

## Thermal Data

| Parameter                               | Symbol           | Steady State | Unit |
|-----------------------------------------|------------------|--------------|------|
| Thermal Resistance, Junction-to-case    | R <sub>θJC</sub> | 2.2          | °C/W |
| Thermal Resistance, Junction-to-ambient | R <sub>θJA</sub> | 35           |      |

Note:

- \*a. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
- \*b. The value of R<sub>θJA</sub> 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<sub>A</sub>=25°C. The power dissipation P<sub>D</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- \*c. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and low duty cycles to keep initial T<sub>J</sub>=25°C.

## Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise specified)

| Symbol                    | Min. | Typ. | Max. | Unit | Test Conditions                                                                     |
|---------------------------|------|------|------|------|-------------------------------------------------------------------------------------|
| Static                    |      |      |      |      |                                                                                     |
| BV <sub>DSS</sub>         | 150  | -    | -    | V    | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                          |
| V <sub>GS(th)</sub>       | 2    | -    | 4    |      | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                            |
| G <sub>FS</sub>           | -    | 8.5  | -    | S    | V <sub>DS</sub> =5V, I <sub>D</sub> =6A                                             |
| 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> =120V, V <sub>GS</sub> =0V                                          |
| R <sub>DS(ON)</sub>       | -    | 38   | 50   | mΩ   | V <sub>GS</sub> =10V, I <sub>D</sub> =6A                                            |
| Dynamic                   |      |      |      |      |                                                                                     |
| C <sub>iss</sub>          | -    | 970  | -    | pF   | V <sub>DS</sub> =75V, V <sub>GS</sub> =0V, f=1MHz                                   |
| C <sub>oss</sub>          | -    | 83   | -    |      |                                                                                     |
| C <sub>rss</sub>          | -    | 24   | -    |      |                                                                                     |
| R <sub>g</sub>            | -    | 0.7  | -    | Ω    | f=1MHz                                                                              |
| Q <sub>g</sub> *1, 2      | -    | 17   | -    | nC   | V <sub>DS</sub> =75V, I <sub>D</sub> =6A, V <sub>GS</sub> =10V                      |
| Q <sub>gs</sub> *1, 2     | -    | 4.9  | -    |      |                                                                                     |
| Q <sub>gd</sub> *1, 2     | -    | 4.3  | -    |      |                                                                                     |
| t <sub>d(ON)</sub> *1, 2  | -    | 14   | -    | ns   | V <sub>DS</sub> =75V, I <sub>D</sub> =6A, V <sub>GS</sub> =10V, R <sub>GS</sub> =1Ω |
| t <sub>r</sub> *1, 2      | -    | 17   | -    |      |                                                                                     |
| t <sub>d(OFF)</sub> *1, 2 | -    | 26   | -    |      |                                                                                     |
| t <sub>f</sub> *1, 2      | -    | 7    | -    |      |                                                                                     |
| Source-Drain Diode        |      |      |      |      |                                                                                     |
| V <sub>SD</sub> *1        | -    | 0.8  | 1.2  | V    | I <sub>S</sub> =6A, V <sub>GS</sub> =0V                                             |
| t <sub>rr</sub>           | -    | 48   | -    | ns   | I <sub>F</sub> =6A, dI <sub>F</sub> /dt=100A/μs                                     |
| Q <sub>rr</sub>           | -    | 94   | -    | nC   |                                                                                     |

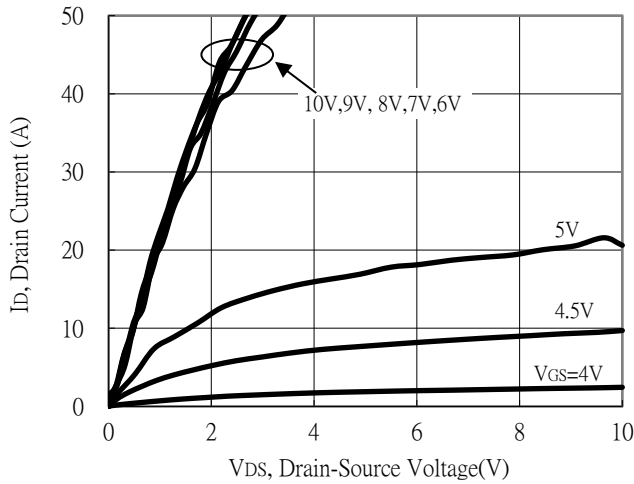
Note:

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

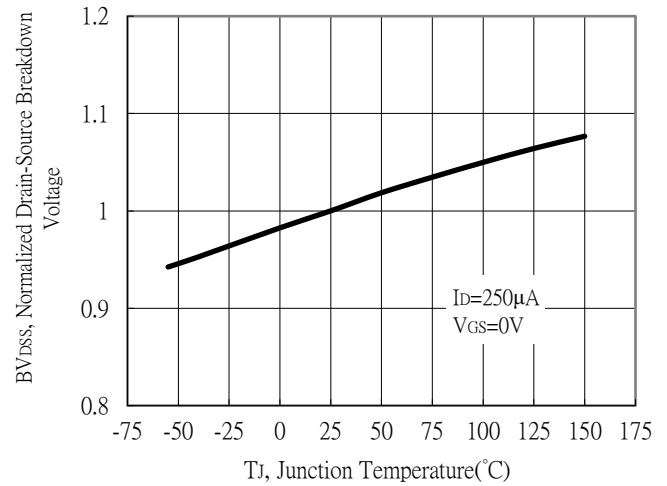
\*2. Independent of operating temperature

## Typical Characteristics

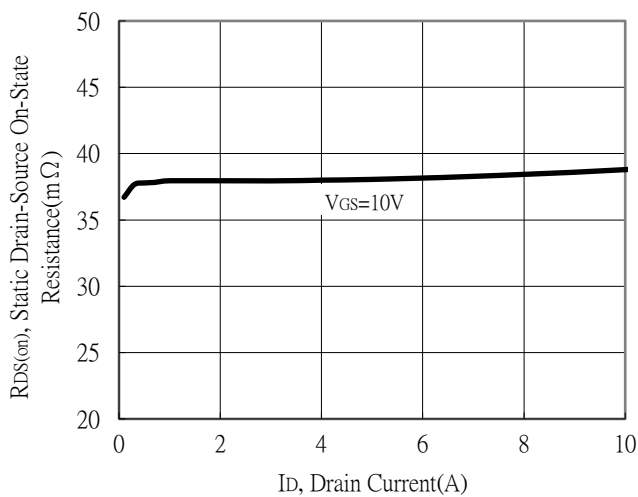
Typical Output Characteristics



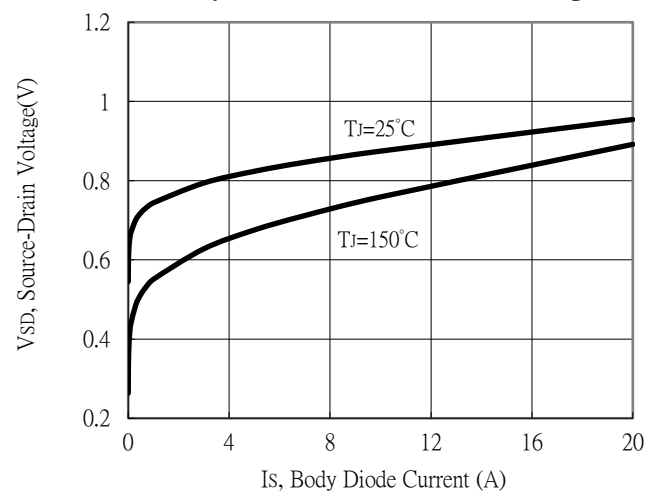
Breakdown Voltage vs Ambient Temperature



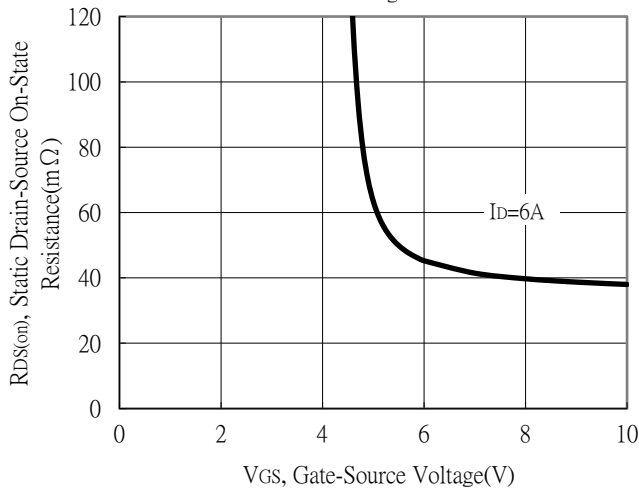
Static Drain-Source On-State resistance vs Drain Current



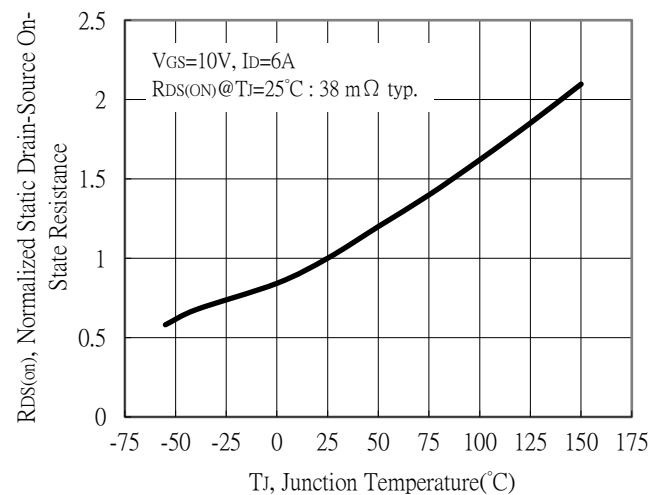
Body Diode Current vs Source-Drain Voltage



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

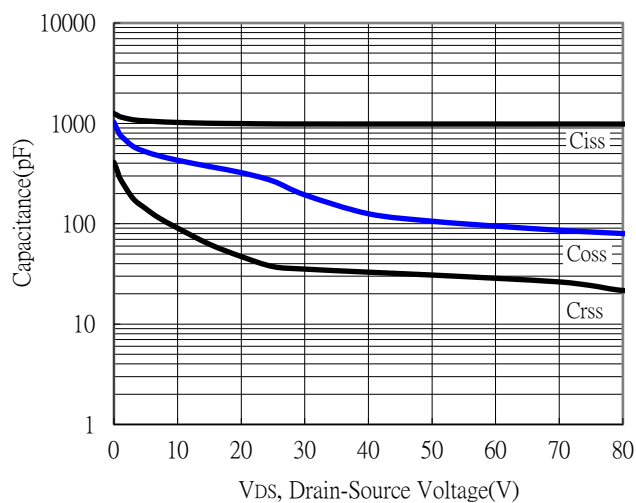


Drain-Source On-State Resistance vs Junction Temperature

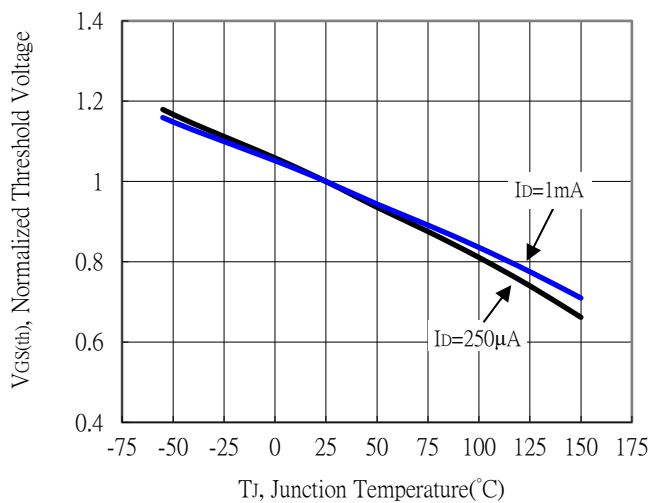


## Typical Characteristics (Cont.)

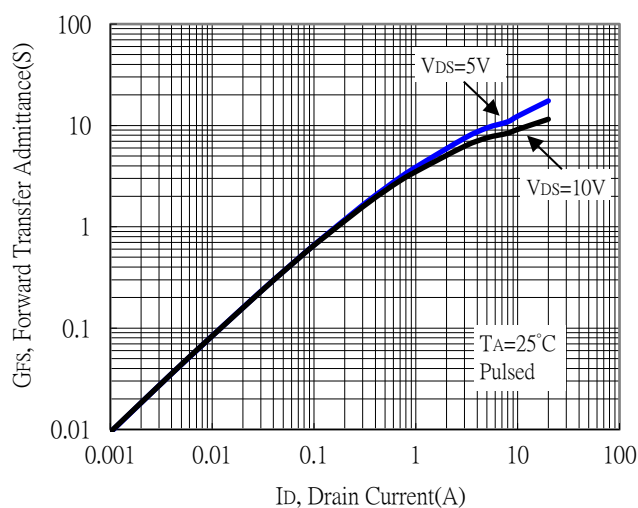
Capacitance vs Drain-to-Source Voltage



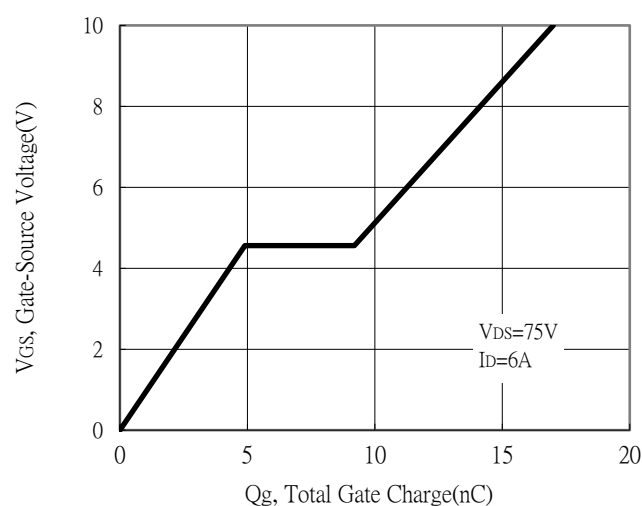
Threshold Voltage vs Junction Temperature



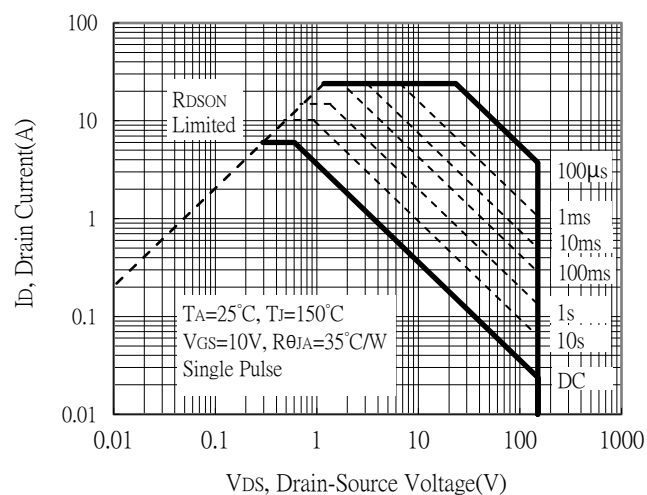
Forward Transfer Admittance vs Drain Current



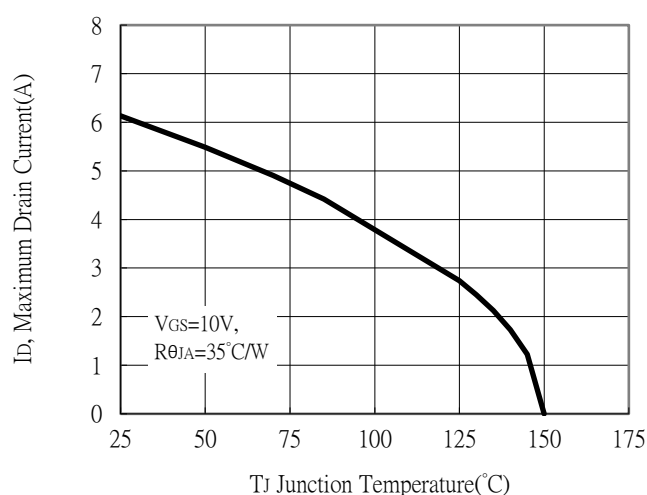
Gate Charge Characteristics



Maximum Safe Operating Area

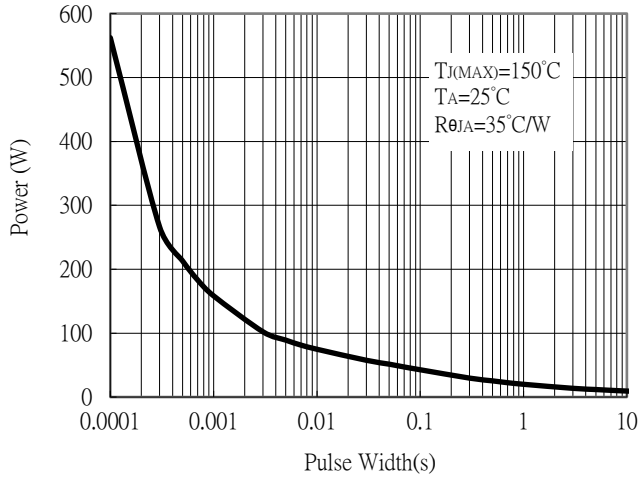


Maximum Drain Current vs Junction Temperature

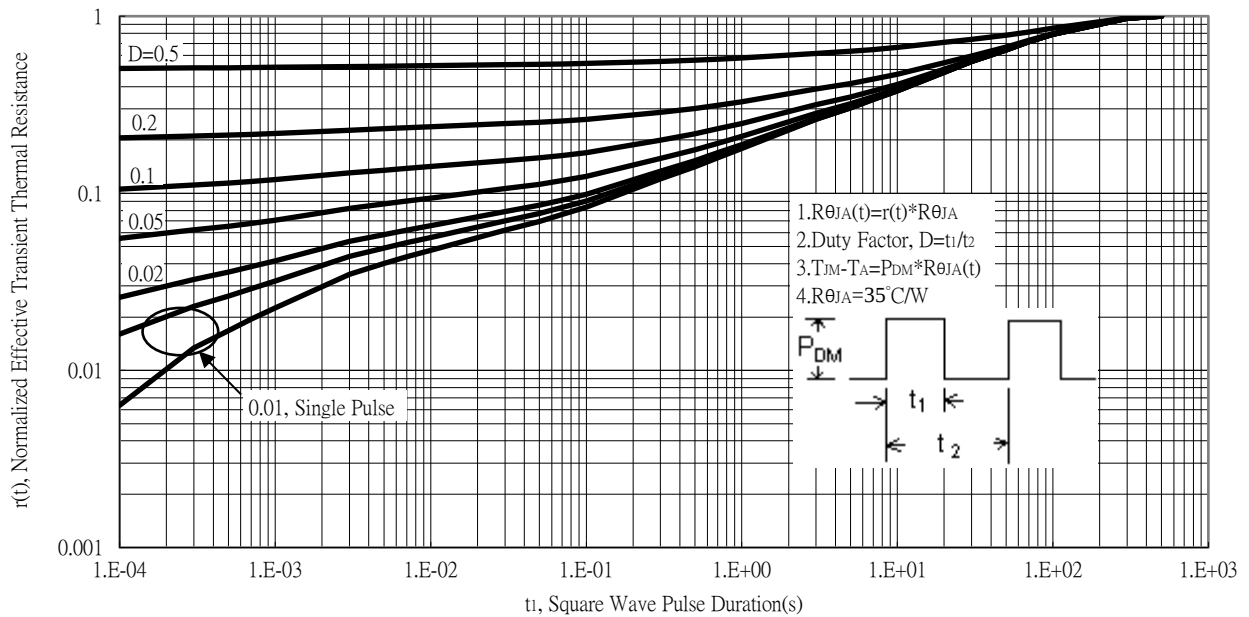


## Typical Characteristics (Cont.)

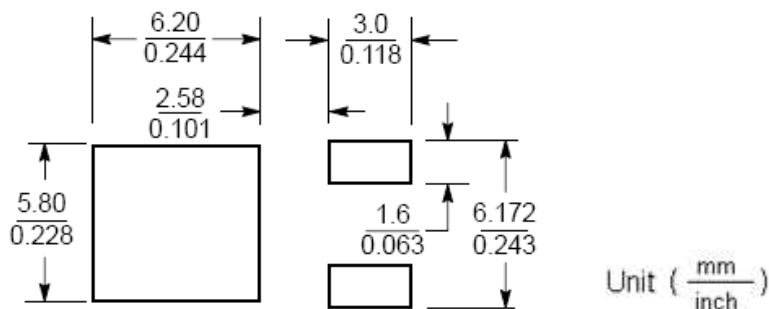
Single Pulse Power Rating, Junction to Ambient



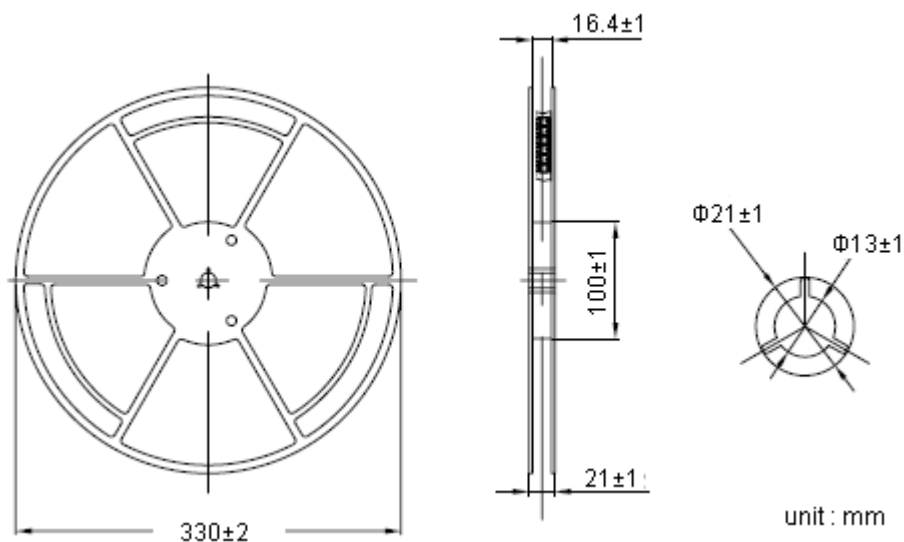
Transient Thermal Response Curves



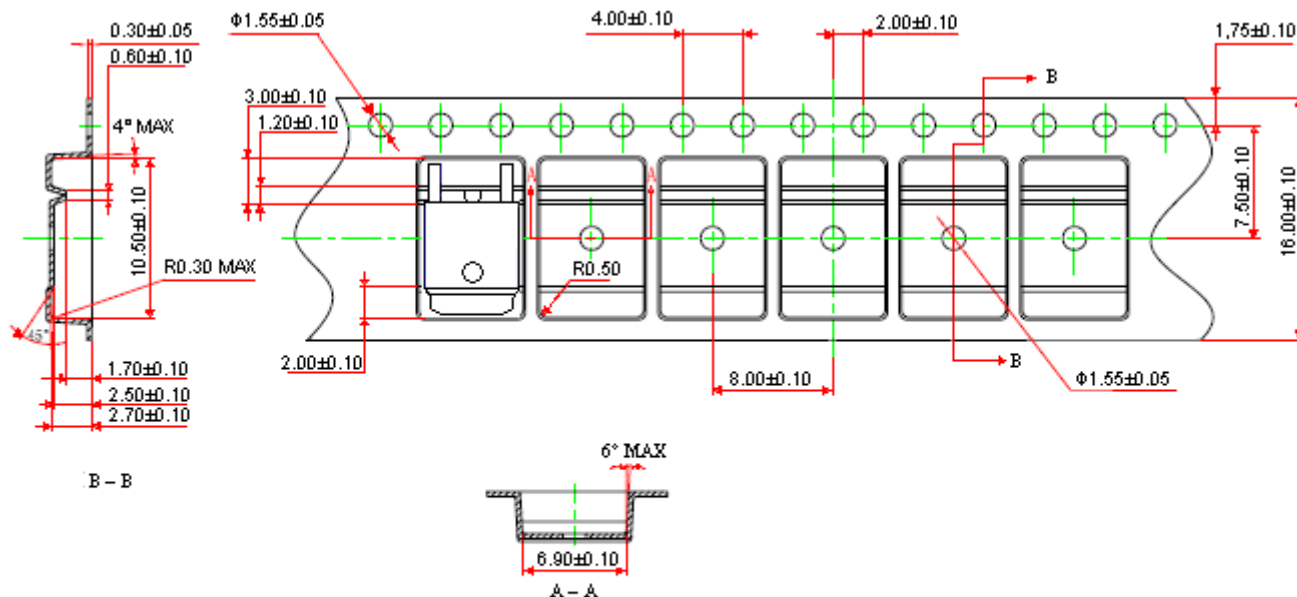
## Recommended soldering footprint



## Reel Dimension



## Carrier Tape Dimension

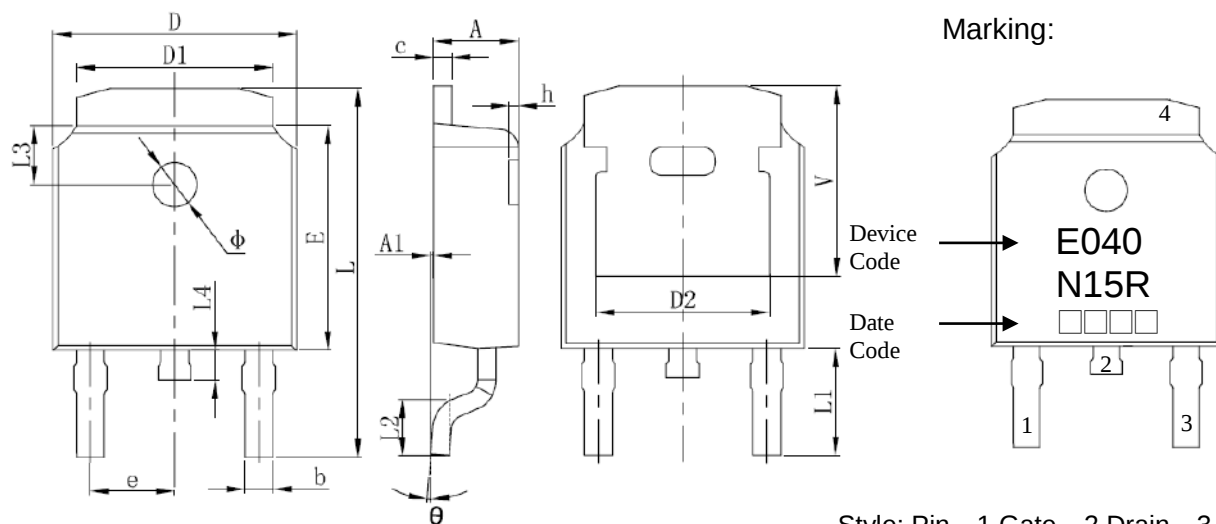


Notes:

1. 10 sprocket hole pitch cumulative tolerance  $\pm 0.2$ .
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated :  $10^5 \Omega/\square \sim 10^{11} \Omega/\square$

unit : mm

## TO-252 Dimension



Style: Pin 1.Gate 2.Drain 3.Source  
4.Drain

### 3-Lead TO-252 Plastic Surface Mount Package

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

| DIM | Inches |       | Millimeters |       | DIM | Inches |       | Millimeters |        |
|-----|--------|-------|-------------|-------|-----|--------|-------|-------------|--------|
|     | Min.   | Max.  | Min.        | Max.  |     | Min.   | Max.  | Min.        | Max.   |
| A   | 0.087  | 0.094 | 2.200       | 2.400 | L   | 0.382  | 0.406 | 9.712       | 10.312 |
| A1  | 0.000  | 0.005 | 0.000       | 0.127 | L1  | 0.114  | REF   | 2.900       | REF    |
| b   | 0.025  | 0.030 | 0.635       | 0.770 | L2  | 0.055  | 0.067 | 1.400       | 1.700  |
| c   | 0.018  | 0.023 | 0.460       | 0.580 | L3  | 0.063  | REF   | 1.600       | REF    |
| D   | 0.256  | 0.264 | 6.500       | 6.700 | L4  | 0.024  | 0.039 | 0.600       | 1.000  |
| D1  | 0.201  | 0.215 | 5.100       | 5.460 | Φ   | 0.043  | 0.051 | 1.100       | 1.300  |
| D2  | 0.190  | REF   | 4.830       | REF   | θ   | 0°     | 8°    | 0°          | 8°     |
| E   | 0.236  | 0.244 | 6.000       | 6.200 | h   | 0.000  | 0.012 | 0.000       | 0.300  |
| e   | 0.086  | 0.094 | 2.186       | 2.386 | V   | 0.207  | REF   | 5.250       | REF    |