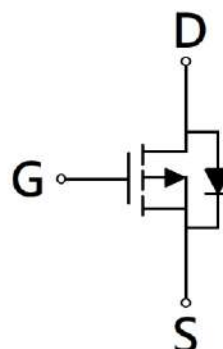
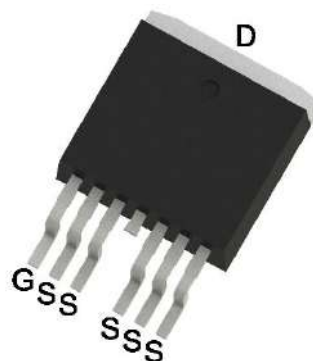


## P-Channel Enhancement Mode Power MOSFET

### Features:

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

TO-263-7L-4C



G : Gate S : Source D : Drain

|                                                 |               |
|-------------------------------------------------|---------------|
| $BV_{DSS}$                                      | -60V          |
| $I_D @ V_{GS} = -10V, T_C = 25^\circ C$         | -124A         |
| $I_D @ V_{GS} = -10V, T_A = 25^\circ C$         | -23A          |
| $R_{DS(ON)}$ typ. @ $V_{GS} = -10V, I_D = -20A$ | 3.5m $\Omega$ |

### Ordering Information

| Device    | Package                                                           | Shipping              |
|-----------|-------------------------------------------------------------------|-----------------------|
| KUE2D1P06 | TO-263-7L-4C<br>(Pb-free lead plating and RoHS compliant package) | 800 pcs / Tape & Reel |

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

| Parameter                                                               | Symbol                            | Limits   | Unit |
|-------------------------------------------------------------------------|-----------------------------------|----------|------|
| Drain-Source Voltage                                                    | V <sub>DS</sub>                   | -60      | 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>                    | -124     | A    |
| Continuous Drain Current @ V <sub>GS</sub> =-10V, T <sub>C</sub> =100°C |                                   | -78      |      |
| Continuous Drain Current @ V <sub>GS</sub> =-10V, T <sub>A</sub> =25°C  |                                   | -23      |      |
| Continuous Drain Current @ V <sub>GS</sub> =-10V, T <sub>A</sub> =70°C  |                                   | -18      |      |
| Pulsed Drain Current                                                    | I <sub>DM</sub>                   | -496     |      |
| Continuous Body Diode Forward Current @ T <sub>C</sub> =25°C            | I <sub>S</sub>                    | -115     |      |
| Pulsed Body Diode Forward Current @ T <sub>C</sub> =25°C                | I <sub>SM</sub>                   | -460     |      |
| Avalanche Current @ L=0.1mH                                             | I <sub>AS</sub>                   | -60      | mJ   |
| Avalanche Energy @ L=0.5mH                                              | E <sub>AS</sub>                   | 625      |      |
| Total Power Dissipation                                                 | T <sub>C</sub> =25°C              | 139      | W    |
|                                                                         | T <sub>C</sub> =100°C             | 56       |      |
|                                                                         | T <sub>A</sub> =25°C              | 4.6      |      |
|                                                                         | T <sub>A</sub> =70°C              | 2.9      |      |
| 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> | 0.9          | °C/W |
| Thermal Resistance, Junction-to-ambient | R <sub>θJA</sub> | 27           |      |

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>         | -60  | -     | -    | V    | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                              |
| V <sub>GS(th)</sub>       | -2.5 | -     | -5   |      | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                |
| G <sub>FS</sub>           | -    | 13.8  | -    | S    | V <sub>DS</sub> =-10V, I <sub>D</sub> =-20A                                              |
| 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> =-48V, V <sub>GS</sub> =0V                                               |
| R <sub>DS(ON)</sub>       | -    | 3.5   | 4.5  | mΩ   | V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A                                              |
| Dynamic                   |      |       |      |      |                                                                                          |
| C <sub>iss</sub>          | -    | 17000 | -    | pF   | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, f=1MHz                                       |
| C <sub>oss</sub>          | -    | 1000  | -    |      |                                                                                          |
| C <sub>rss</sub>          | -    | 280   | -    |      |                                                                                          |
| R <sub>g</sub>            | -    | 2     | -    | Ω    | f=1MHz                                                                                   |
| Q <sub>g</sub> *1, 2      | -    | 260   | -    | nC   | V <sub>DS</sub> =-30V, I <sub>D</sub> =-20A, V <sub>GS</sub> =-10V                       |
| Q <sub>gs</sub> *1, 2     | -    | 88    | -    |      |                                                                                          |
| Q <sub>gd</sub> *1, 2     | -    | 58    | -    |      |                                                                                          |
| t <sub>d(ON)</sub> *1, 2  | -    | 73    | -    | ns   | V <sub>DS</sub> =-30V, I <sub>D</sub> =-20A, V <sub>GS</sub> =-10V, R <sub>GS</sub> =1 Ω |
| t <sub>r</sub> *1, 2      | -    | 50    | -    |      |                                                                                          |
| t <sub>d(OFF)</sub> *1, 2 | -    | 185   | -    |      |                                                                                          |
| t <sub>f</sub> *1, 2      | -    | 80    | -    |      |                                                                                          |
| Source-Drain Diode        |      |       |      |      |                                                                                          |
| V <sub>SD</sub> *1        | -    | -0.78 | -1.2 | V    | I <sub>S</sub> =-20A, V <sub>GS</sub> =0V                                                |
| t <sub>rr</sub>           | -    | 43    | -    | ns   | I <sub>F</sub> =-20A, dI <sub>F</sub> /dt=100A/μs                                        |
| Q <sub>rr</sub>           | -    | 62    | -    | nC   |                                                                                          |

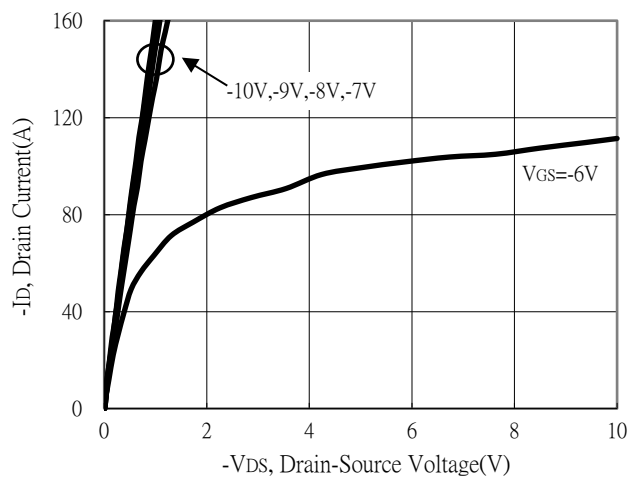
Note:

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

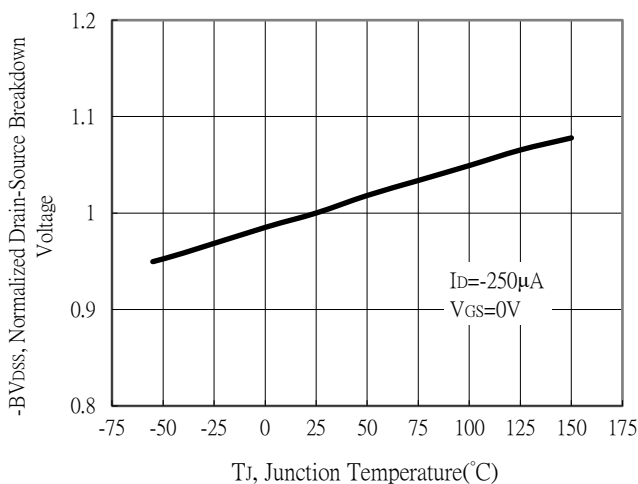
\*2. Independent of operating temperature

## Typical Characteristics

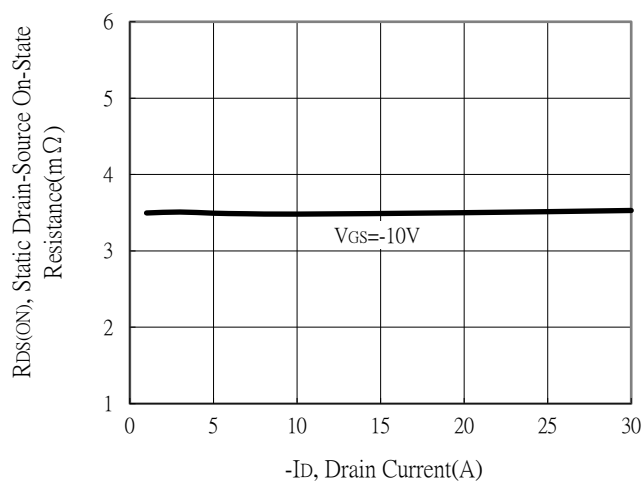
Typical Output Characteristics



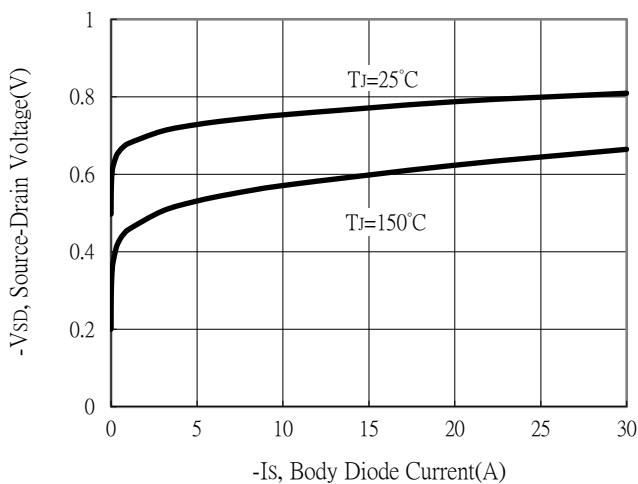
Breakdown Voltage vs Ambient Temperature



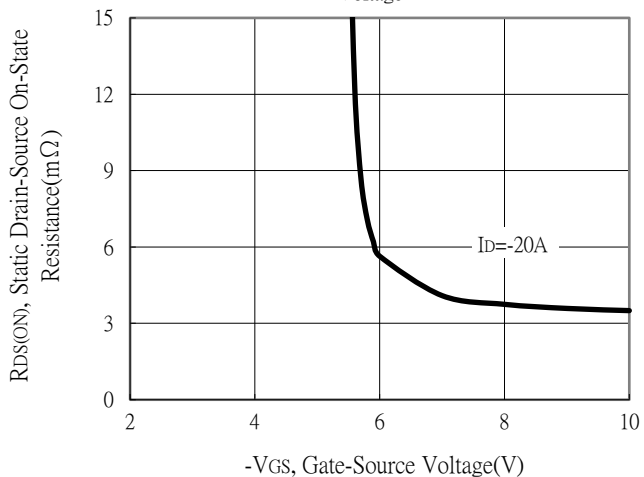
Static Drain-Source On-State resistance vs Drain Current



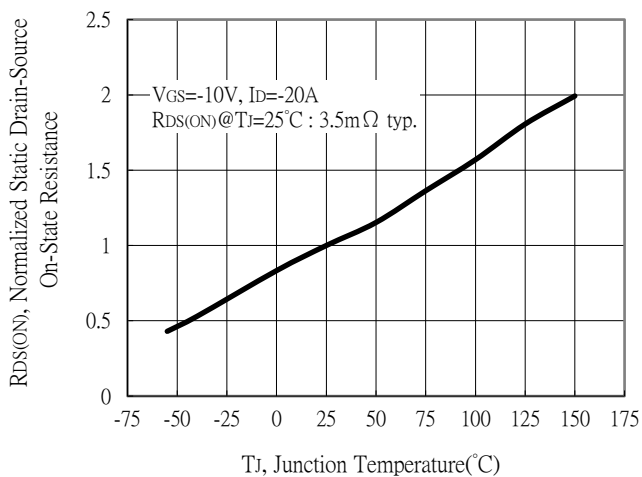
Body Diode Current vs Source-Drain Voltage



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

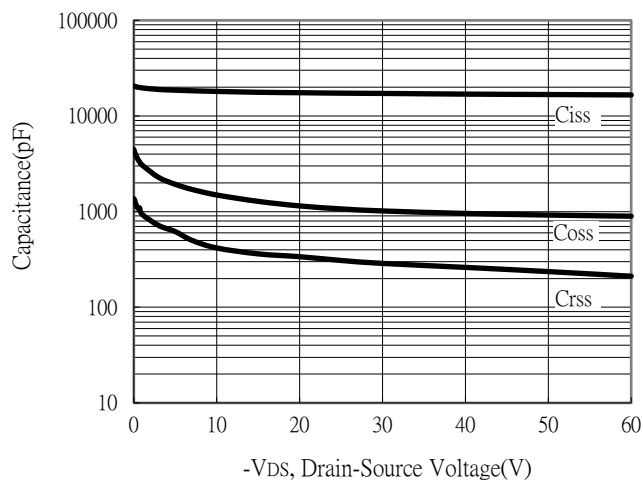


Drain-Source On-State Resistance vs Junction Temperature

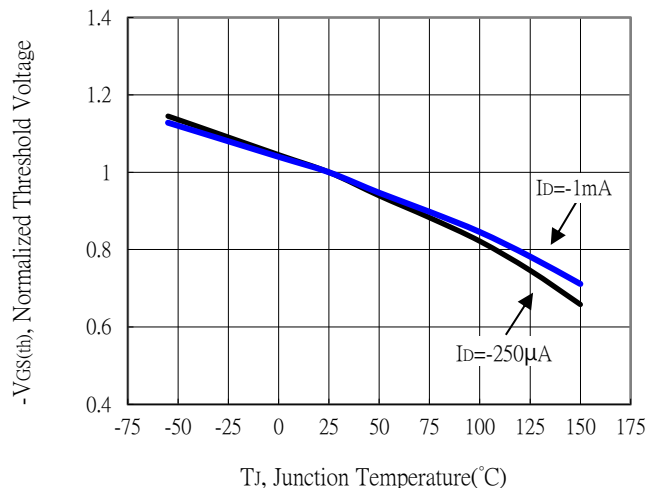


## Typical Characteristics (Cont.)

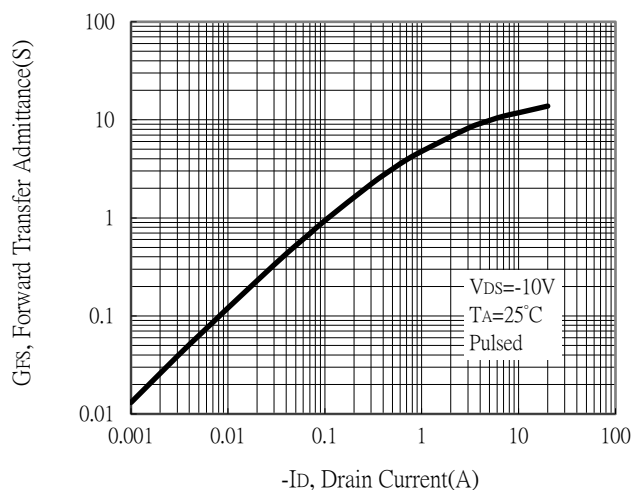
Capacitance vs Drain-to-Source Voltage



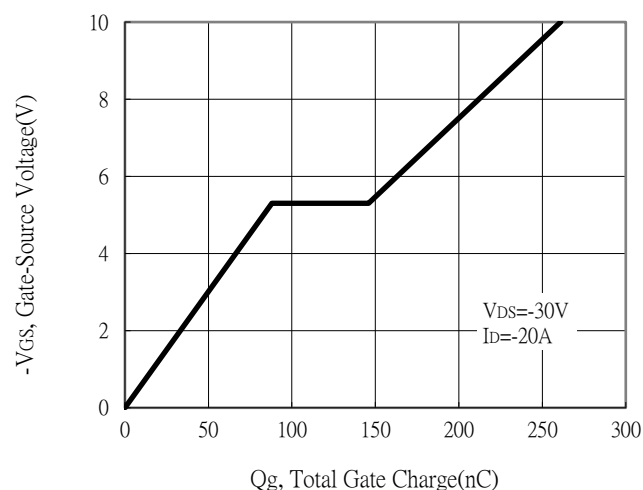
Threshold Voltage vs Junction Temperature



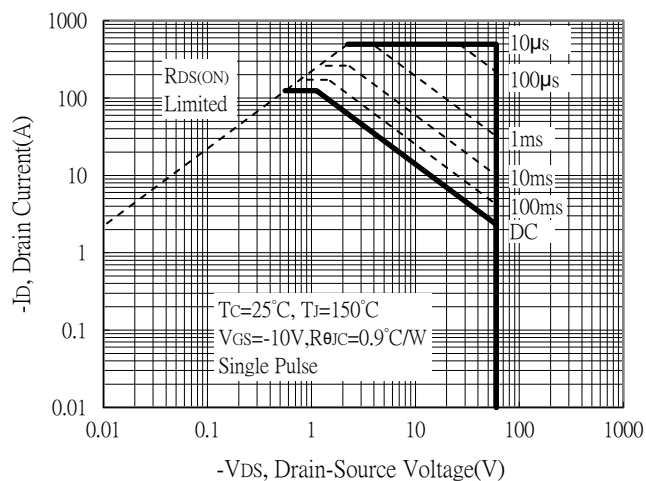
Forward Transfer Admittance vs Drain Current



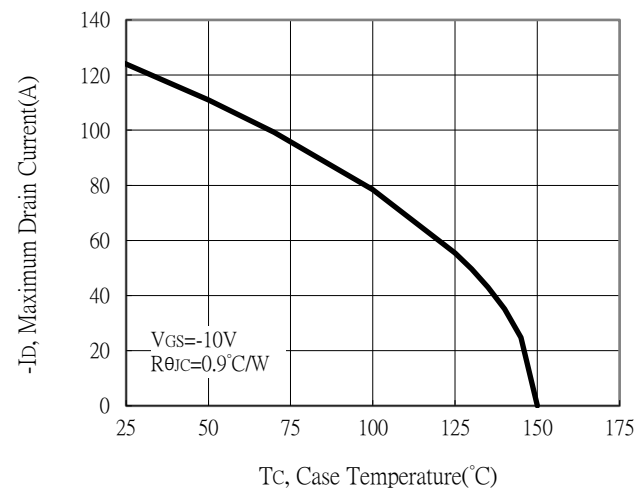
Gate Charge Characteristics



Maximum Safe Operating Area

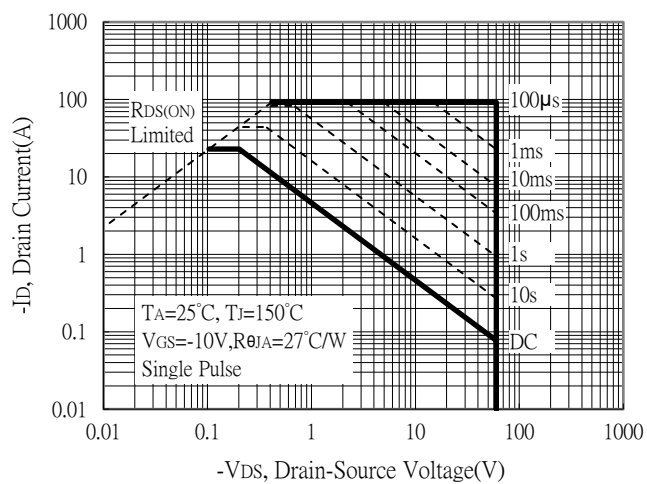


Maximum Drain Current vs Case Temperature

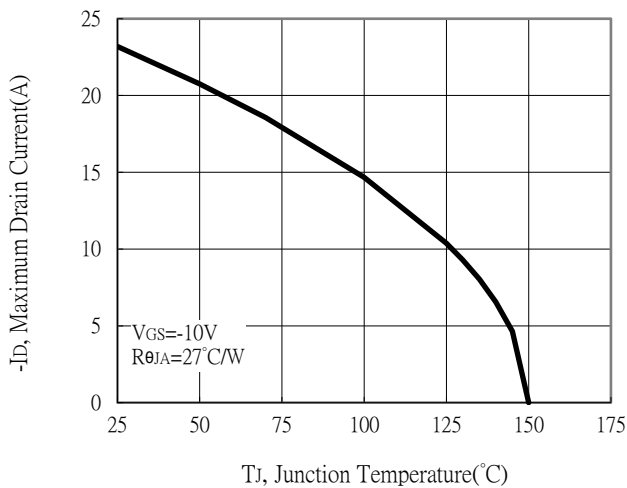


## Typical Characteristics (Cont.)

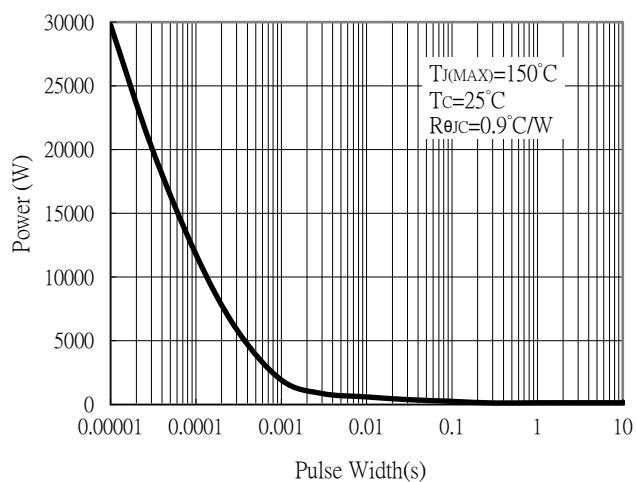
Maximum Safe Operating Area



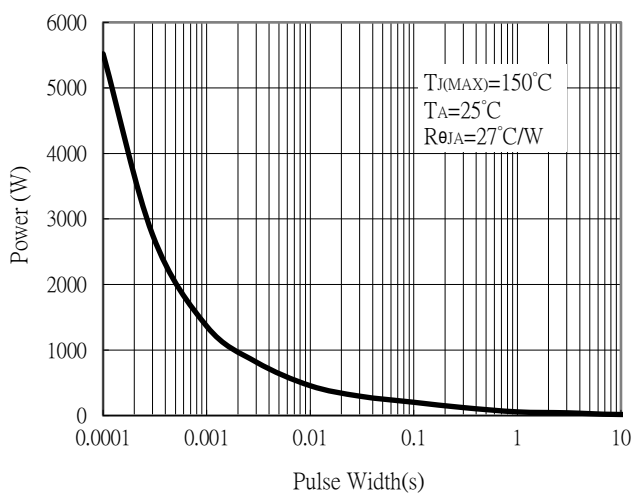
Maximum Drain Current vs Junction Temperature



Single Pulse Power Rating, Junction to Case

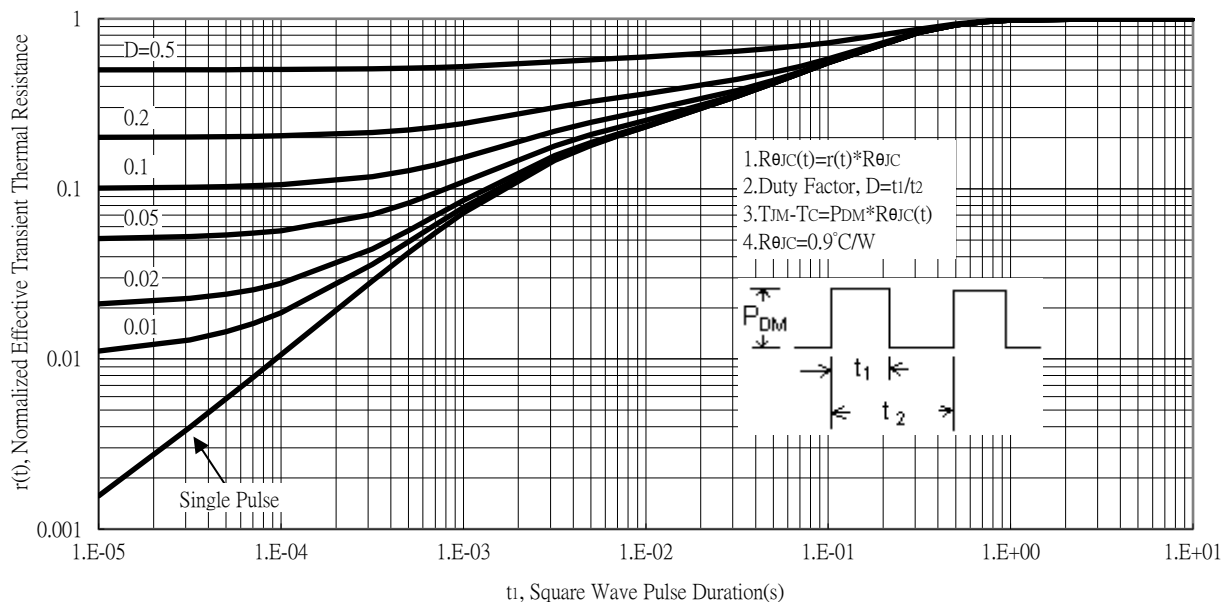


Single Pulse Power Rating, Junction to Ambient

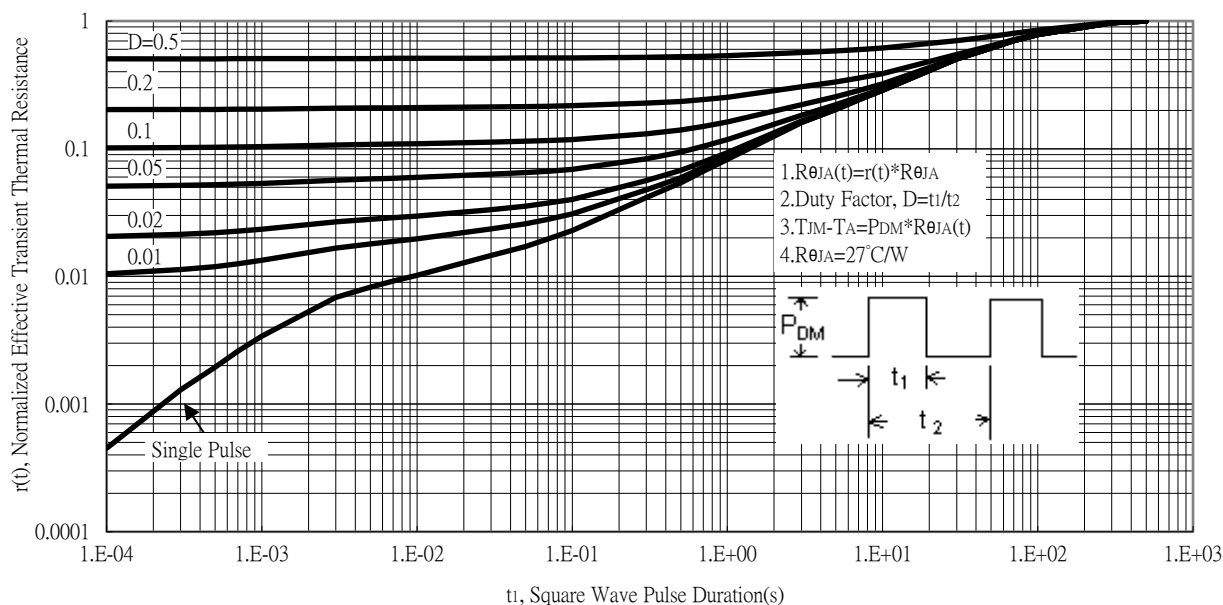


## Typical Characteristics (Cont.)

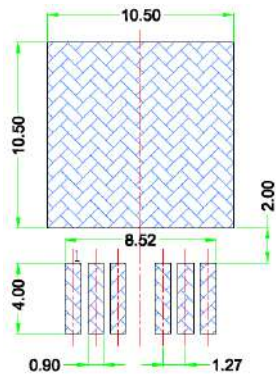
Transient Thermal Response Curves



Transient Thermal Response Curves

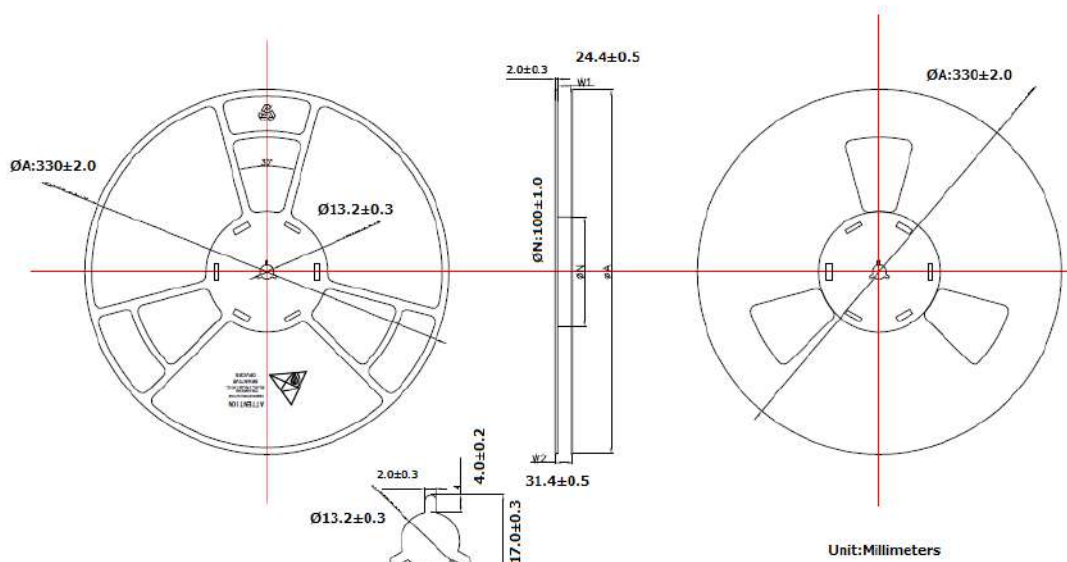


## Recommended Soldering Footprint

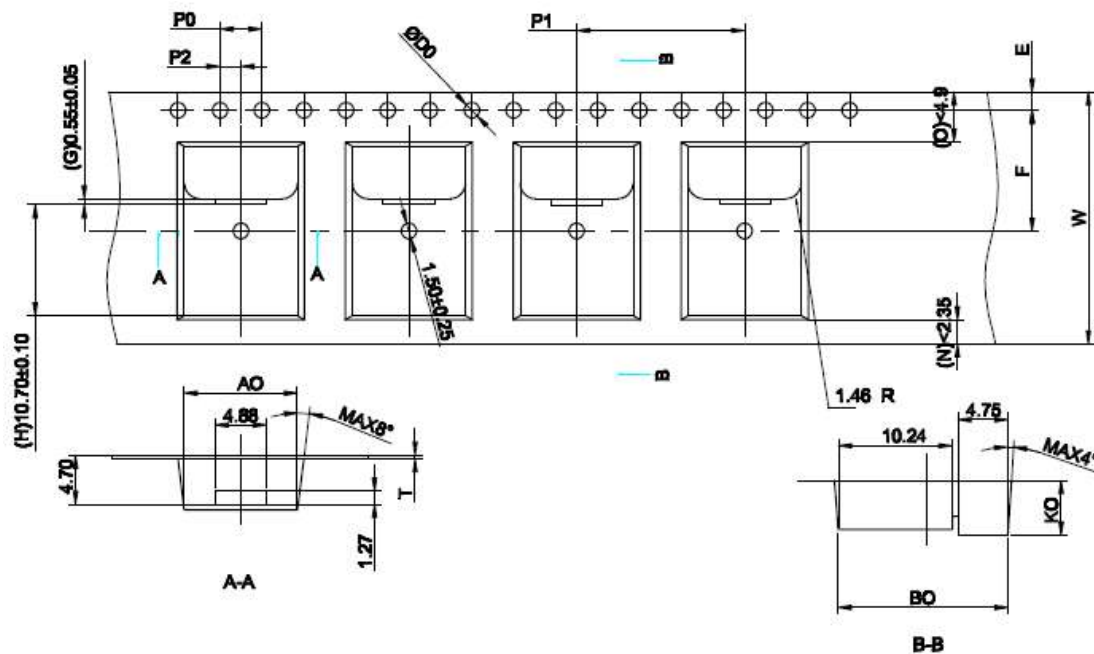


Unit : mm

## Reel Dimension



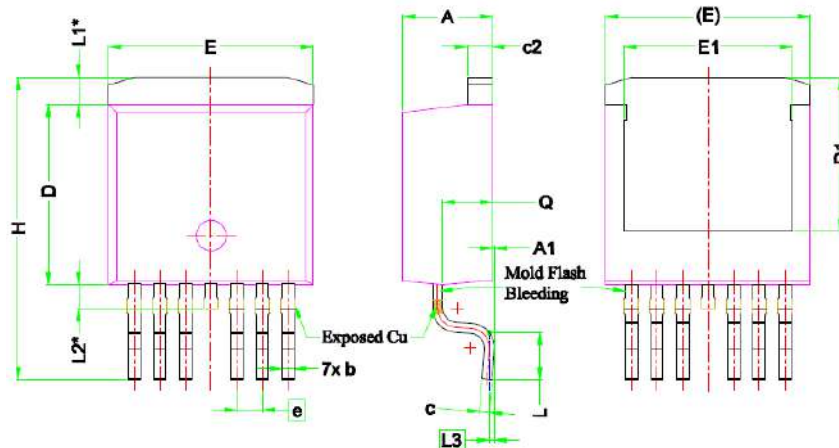
## Carrier Tape Dimension



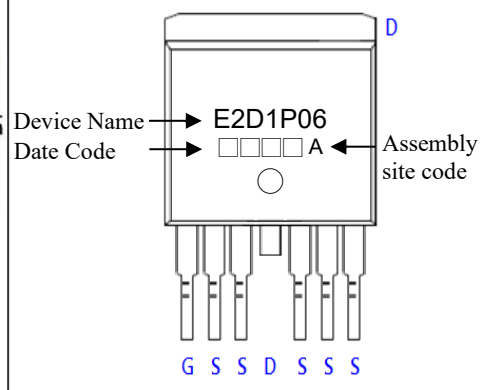
| SYMBOL | A0         | B0         | K0        | P0               | P1         | P2        | T         | N     |
|--------|------------|------------|-----------|------------------|------------|-----------|-----------|-------|
| SPEC   | 10.80±0.10 | 18.13±0.10 | 5.21±0.10 | 4.00±0.10        | 16.00±0.10 | 2.00±0.10 | 0.35±0.05 | <2.35 |
| SYMBOL | E          | F          | ØD0       | W                | H          | G         | O         |       |
| SPEC   | 1.75±0.10  | 11.50±0.10 | 1.55±0.05 | 24.00+0.30/-0.10 | 10.70±0.10 | 0.55±0.05 | <4.9      |       |



## TO-263-7L-4C Dimension



Marking :



Style : Pin 1. Gate  
 Pin 2, 3, 5, 6, 7 : Source  
 Pin 4. Drain

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

7-Lead Plastic Surface Mounted TO-263-7L Package

| DIM | Inches |       | Millimeters |       | DIM | Inches     |       | Millimeters |       |
|-----|--------|-------|-------------|-------|-----|------------|-------|-------------|-------|
|     | Min.   | Max.  | Min.        | Max.  |     | Min.       | Max.  | Min.        | Max.  |
| A   | 0.167  | 0.183 | 4.24        | 4.64  | E1  | 0.271      | 0.310 | 6.89        | 7.89  |
| A1  | 0.000  | 0.010 | 0.00        | 0.25  | e   | 0.050 BSC  |       | 1.27        | BSC   |
| b   | 0.020  | 0.028 | 0.50        | 0.70  | H   | 0.575      | 0.625 | 14.61       | 15.88 |
| c   | 0.016  | 0.024 | 0.40        | 0.60  | L   | 0.070      | 0.110 | 1.78        | 2.79  |
| c2  | 0.045  | 0.055 | 1.15        | 1.40  | L1  | 0.054 REF. |       | 1.36        | REF.  |
| D   | 0.347  | 0.355 | 8.82        | 9.02  | L2  | 0.047 REF. |       | 1.20        | REF.  |
| D1  | 0.270  | -     | 6.86        | -     | L3  | 0.010 BSC  |       | 0.25        | BSC   |
| E   | 0.392  | 0.408 | 9.96        | 10.36 | Q   | 0.091      | 0.106 | 2.30        | 2.70  |