

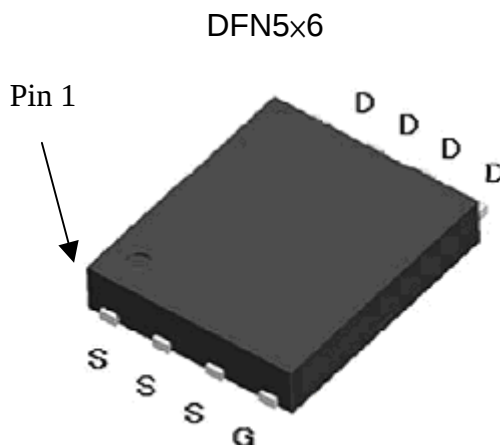
## N-Channel Enhancement Mode Power MOSFET

### Outline

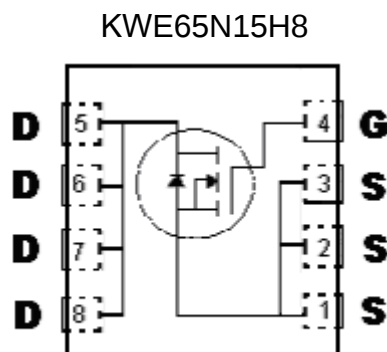
#### Features:

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

|                                                    |                                      |
|----------------------------------------------------|--------------------------------------|
| <b><math>BV_{DSS}</math></b>                       | <b>150V</b>                          |
| <b><math>I_D@V_{GS}=10V, T_C=25^\circ C</math></b> | <b>18A</b>                           |
| <b><math>R_{DS(ON)}@V_{GS}=10V, I_D=15A</math></b> | <b>55 m<math>\Omega</math> (typ)</b> |
| <b><math>R_{DS(ON)}@V_{GS}=7V, I_D=10A</math></b>  | <b>61m<math>\Omega</math> (typ)</b>  |



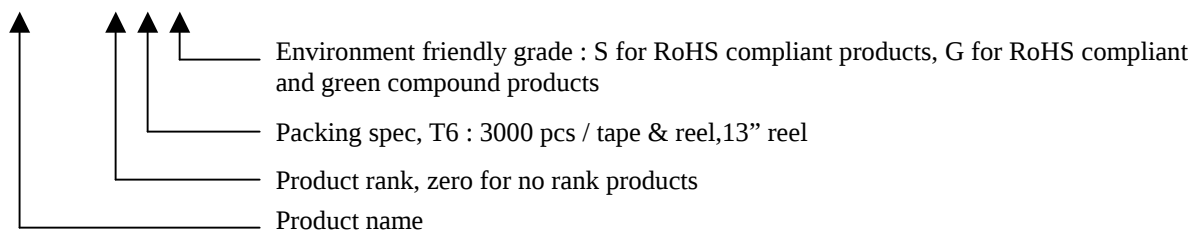
### Symbol



G : Gate D : Drain S : Source

### Ordering Information

| Device            | Package                                                     | Shipping               |
|-------------------|-------------------------------------------------------------|------------------------|
| KWE65N15H8-0-T6-G | DFN 5 x6<br>(Pb-free lead plating and halogen-free package) | 3000 pcs / tape & reel |



## Absolute Maximum Ratings (T<sub>C</sub>=25°C, unless otherwise noted)

| Parameter                                                                                    |                                | Symbol                            | Limits   | Unit |
|----------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------|----------|------|
| Drain-Source Voltage (Note 1)                                                                |                                | V <sub>DS</sub>                   | 150      | V    |
| Gate-Source Voltage                                                                          |                                | V <sub>GS</sub>                   | ±20      |      |
| Continuous Drain Current @T <sub>C</sub> =25°C, V <sub>GS</sub> =10V (Note 1)                |                                | I <sub>D</sub>                    | 18       | A    |
| Continuous Drain Current @T <sub>C</sub> =100°C, V <sub>GS</sub> =10V (Note 1)               |                                |                                   | 11.4     |      |
| Continuous Drain Current @T <sub>A</sub> =25°C, V <sub>GS</sub> =10V (Note 2)                |                                | I <sub>DSM</sub>                  | 4.0      |      |
| Continuous Drain Current @T <sub>A</sub> =70°C, V <sub>GS</sub> =10V (Note 2)                |                                |                                   | 3.2      |      |
| Pulsed Drain Current @ V <sub>GS</sub> =10V (Note 3)                                         |                                | I <sub>DM</sub>                   | 72       |      |
| Avalanche Current (Note 3)                                                                   |                                | I <sub>AS</sub>                   | 10       |      |
| Single Pulse Avalanche Energy @ L=1mH, I <sub>D</sub> =10Amps, V <sub>DD</sub> =50V (Note 2) |                                | E <sub>AS</sub>                   | 50       | mJ   |
| Repetitive Avalanche Energy (Note 3)                                                         |                                | E <sub>AR</sub>                   | 5        |      |
| Power Dissipation                                                                            | T <sub>C</sub> =25°C (Note 1)  | P <sub>D</sub>                    | 50       | W    |
|                                                                                              | T <sub>C</sub> =100°C (Note 1) |                                   | 20       |      |
|                                                                                              | T <sub>A</sub> =25°C (Note 2)  | P <sub>DSM</sub>                  | 2.5      |      |
|                                                                                              | T <sub>A</sub> =70°C (Note 2)  |                                   | 1.6      |      |
| Operating Junction and Storage Temperature                                                   |                                | T <sub>j</sub> , T <sub>stg</sub> | -55~+150 | °C   |

\*Drain current limited by maximum junction temperature

## Thermal Data

| Parameter                                             | Symbol           | Value | Unit |
|-------------------------------------------------------|------------------|-------|------|
| Thermal Resistance, Junction-to-case, max             | R <sub>θJC</sub> | 2.5   | °C/W |
| Thermal Resistance, Junction-to-ambient, max (Note 4) | R <sub>θJA</sub> | 50    | °C/W |

Note : 1. 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.

2. 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 value in any given application depends on the user's specific board design. The power dissipation P<sub>D</sub>SM is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C.

3. Ratings are based on low frequency and low duty cycles to keep initial T<sub>J</sub>=25°C.

4. When mounted on 1 in<sup>2</sup> copper pad of FR-4 board, t<sub>≤</sub>10s; 125°C/W when mounted on minimum copper pad.

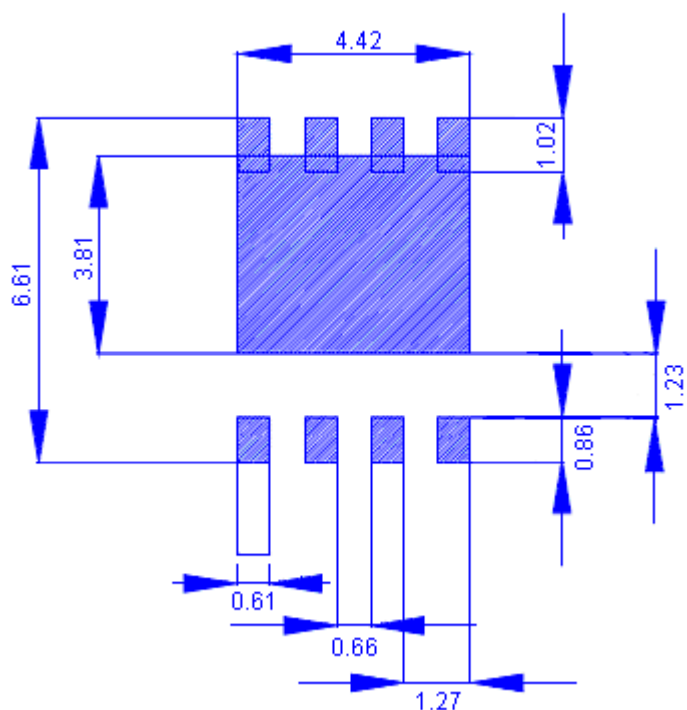
## Characteristics (T<sub>J</sub>=25°C, unless otherwise specified)

| Symbol                              | Min. | Typ. | Max. | Unit | Test Conditions                                                   |
|-------------------------------------|------|------|------|------|-------------------------------------------------------------------|
| <b>Static</b>                       |      |      |      |      |                                                                   |
| BV <sub>DSS</sub>                   | 150  | -    | -    | V    | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                        |
| ΔBV <sub>DSS</sub> /ΔT <sub>j</sub> | -    | 0.1  | -    | V/°C | Reference to 25°C, I <sub>D</sub> =250μA                          |
| V <sub>GS(th)</sub>                 | 2.0  | -    | 4.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA         |
| *G <sub>FS</sub>                    | -    | 19   | -    | 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> =120V, V <sub>GS</sub> =0V                        |
|                                     | -    | -    | 25   |      | V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>j</sub> =125°C |

|                      |   |      |     |    |                                                                                     |
|----------------------|---|------|-----|----|-------------------------------------------------------------------------------------|
| *R <sub>DS(ON)</sub> | - | 55   | 75  | mΩ | V <sub>GS</sub> =10V, I <sub>D</sub> =15A                                           |
|                      | - | 61   | 85  |    | V <sub>GS</sub> =7V, I <sub>D</sub> =10A                                            |
| Dynamic              |   |      |     |    |                                                                                     |
| *Q <sub>g</sub>      | - | 20   | -   | nC | V <sub>DD</sub> =75V, I <sub>D</sub> =15A, V <sub>GS</sub> =10V                     |
| *Q <sub>gs</sub>     | - | 5.5  | -   |    |                                                                                     |
| *Q <sub>gd</sub>     | - | 7    | -   |    |                                                                                     |
| *t <sub>d(ON)</sub>  | - | 6    | -   | ns | V <sub>DD</sub> =75V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω |
| *t <sub>r</sub>      | - | 5    | -   |    |                                                                                     |
| *t <sub>d(OFF)</sub> | - | 13   | -   |    |                                                                                     |
| *t <sub>f</sub>      | - | 6    | -   |    |                                                                                     |
| C <sub>iss</sub>     | - | 1274 | -   | pF | V <sub>GS</sub> =0V, V <sub>DS</sub> =30V, f=1MHz                                   |
| C <sub>oss</sub>     | - | 117  | -   |    |                                                                                     |
| C <sub>rss</sub>     | - | 49   | -   |    |                                                                                     |
| Source-Drain Diode   |   |      |     |    |                                                                                     |
| *I <sub>S</sub>      | - | -    | 18  | A  |                                                                                     |
| *I <sub>SM</sub>     | - | -    | 72  |    |                                                                                     |
| *V <sub>SD</sub>     | - | 0.74 | 1.2 | V  | I <sub>S</sub> =10A, V <sub>GS</sub> =0V                                            |
| *t <sub>rr</sub>     | - | 30   | -   | ns | V <sub>GS</sub> =0V, I <sub>F</sub> =10A, dI <sub>F</sub> /dt=100A/μs               |
| *Q <sub>rr</sub>     | - | 100  | -   | nC |                                                                                     |

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

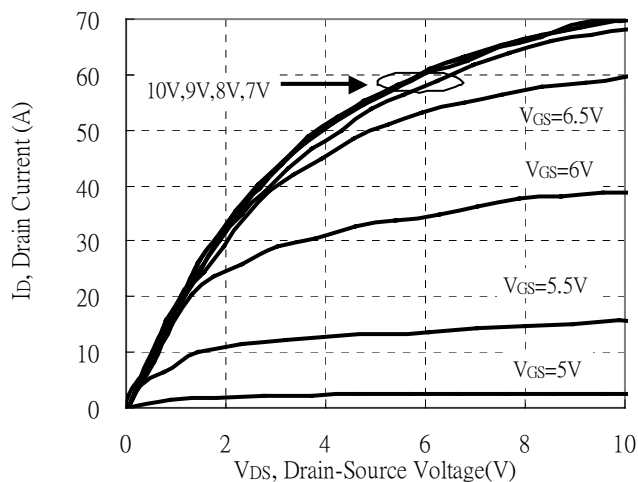
## Recommended Soldering Footprint



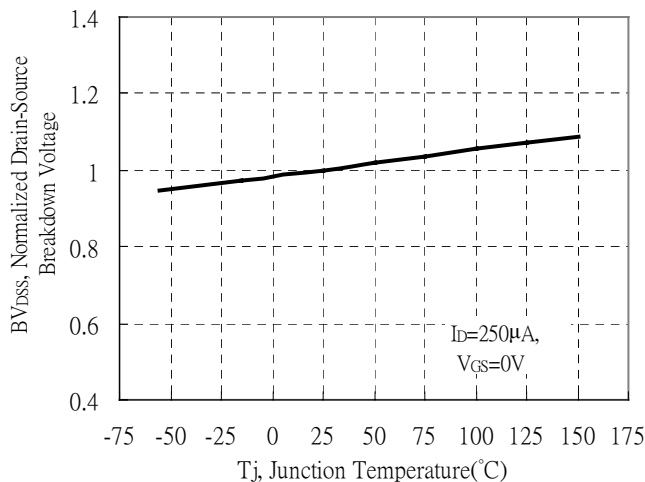
unit : mm

## Typical Characteristics

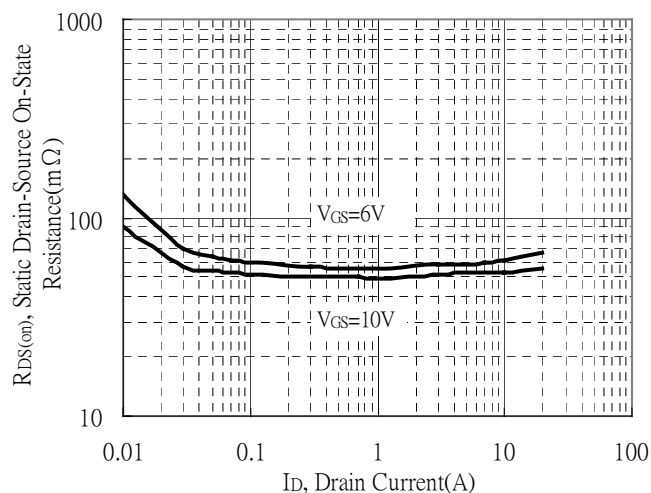
Typical Output Characteristics



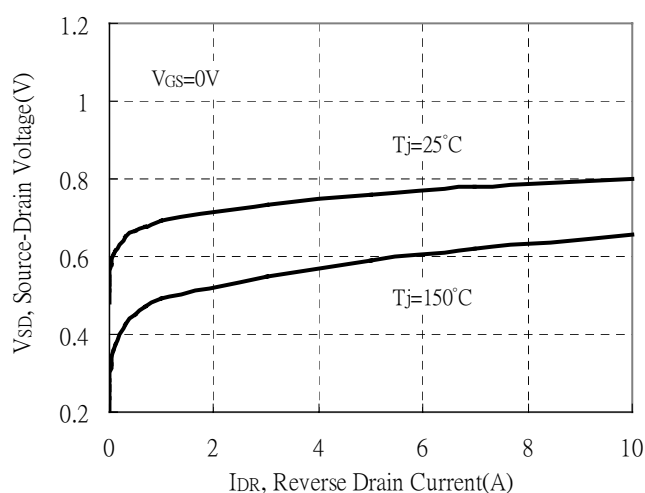
Brekdown Voltage vs Ambient Temperature



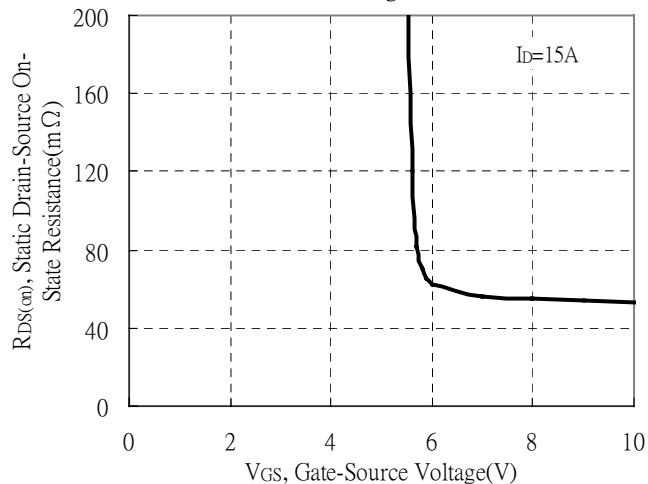
Static Drain-Source On-State resistance vs Drain Current



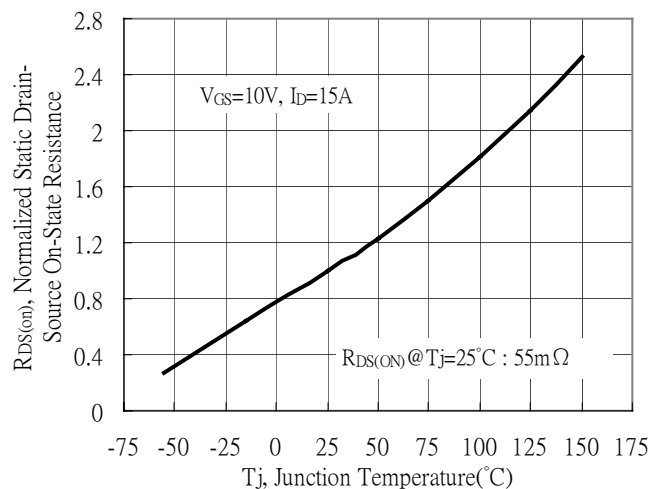
Reverse Drain Current vs Source-Drain Voltage



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

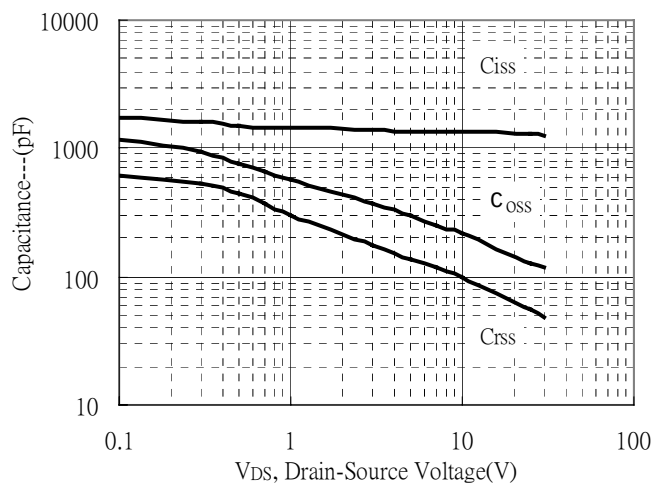


Drain-Source On-State Resistance vs Junction Temperature

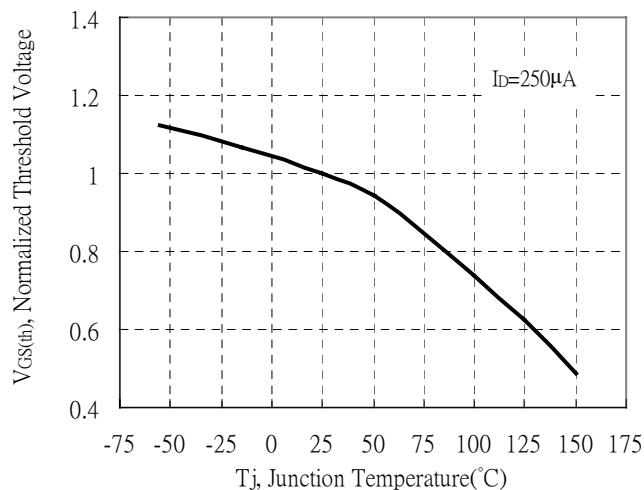


## Typical Characteristics(Cont.)

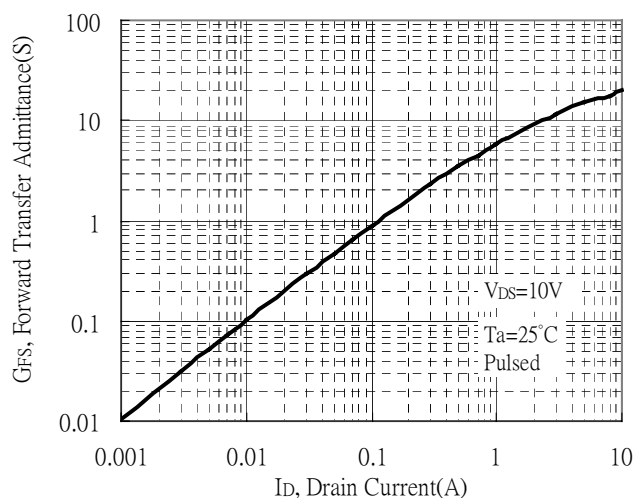
Capacitance vs Drain-to-Source Voltage



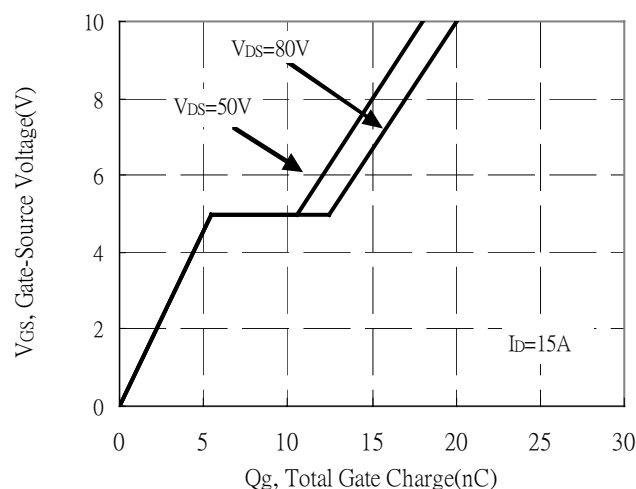
Threshold Voltage vs Junction Temperature



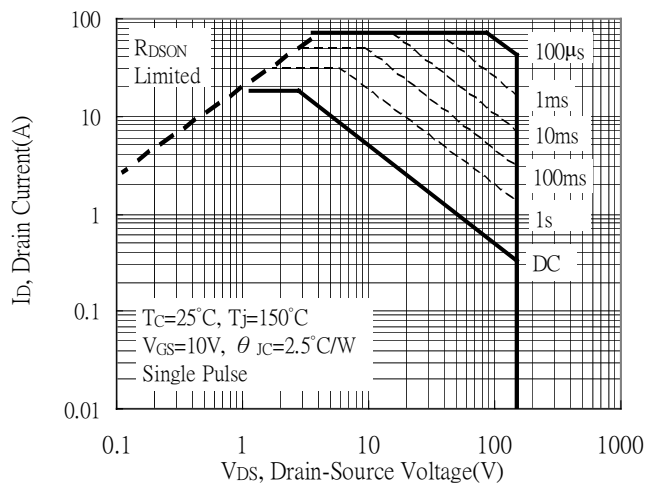
Forward Transfer Admittance vs Drain Current



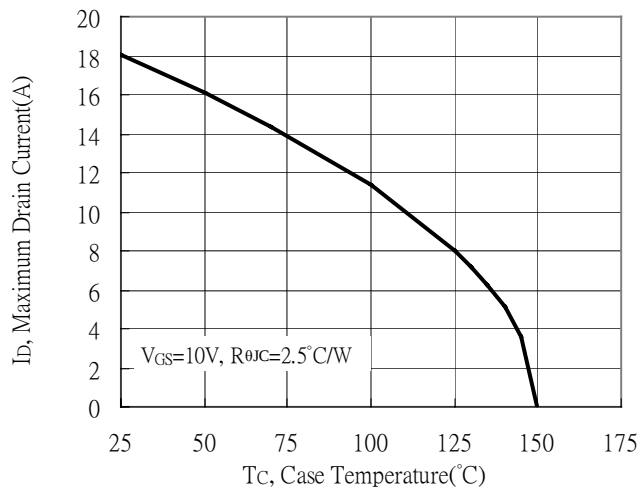
Gate Charge Characteristics



Maximum Safe Operating Area

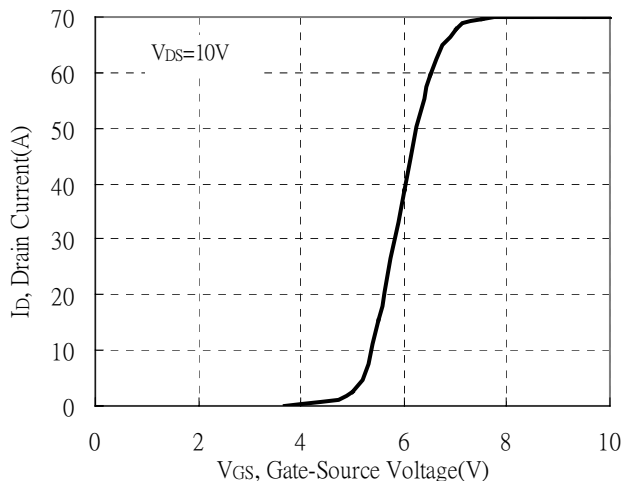


Maximum Drain Current vs Case Temperature

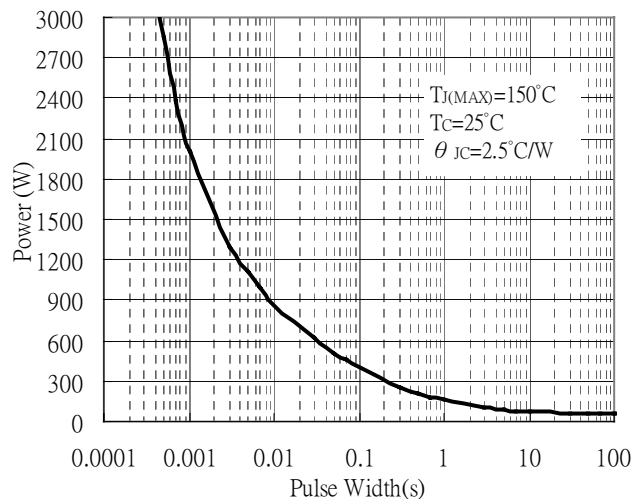


## Typical Characteristics(Cont.)

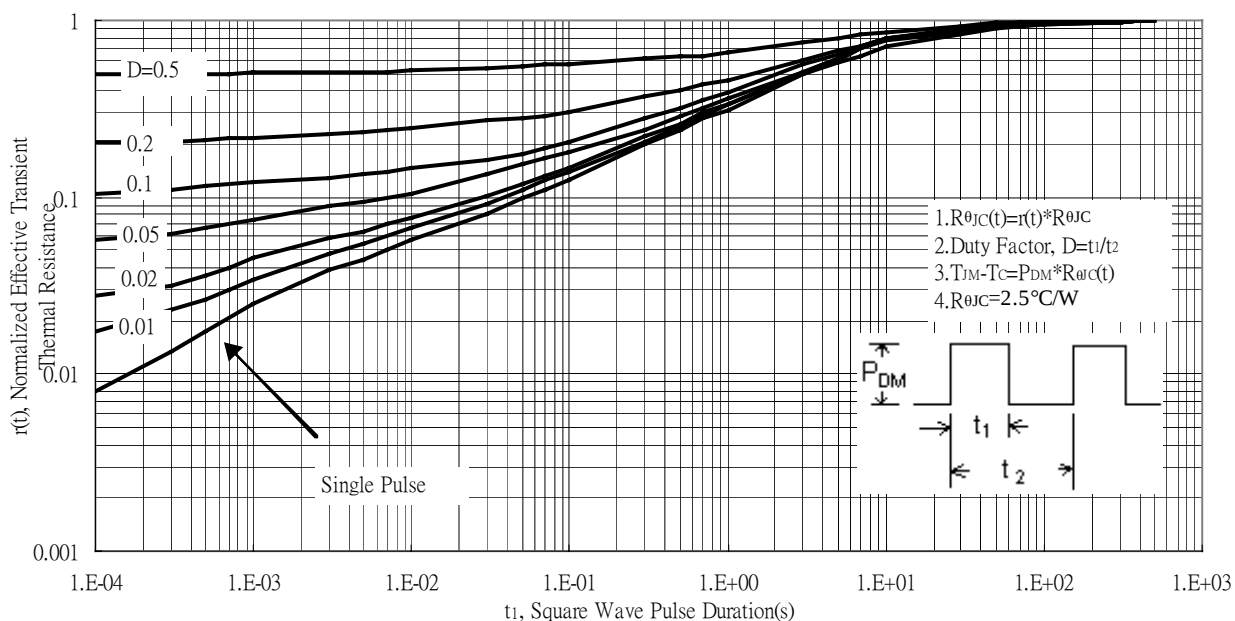
Typical Transfer Characteristics



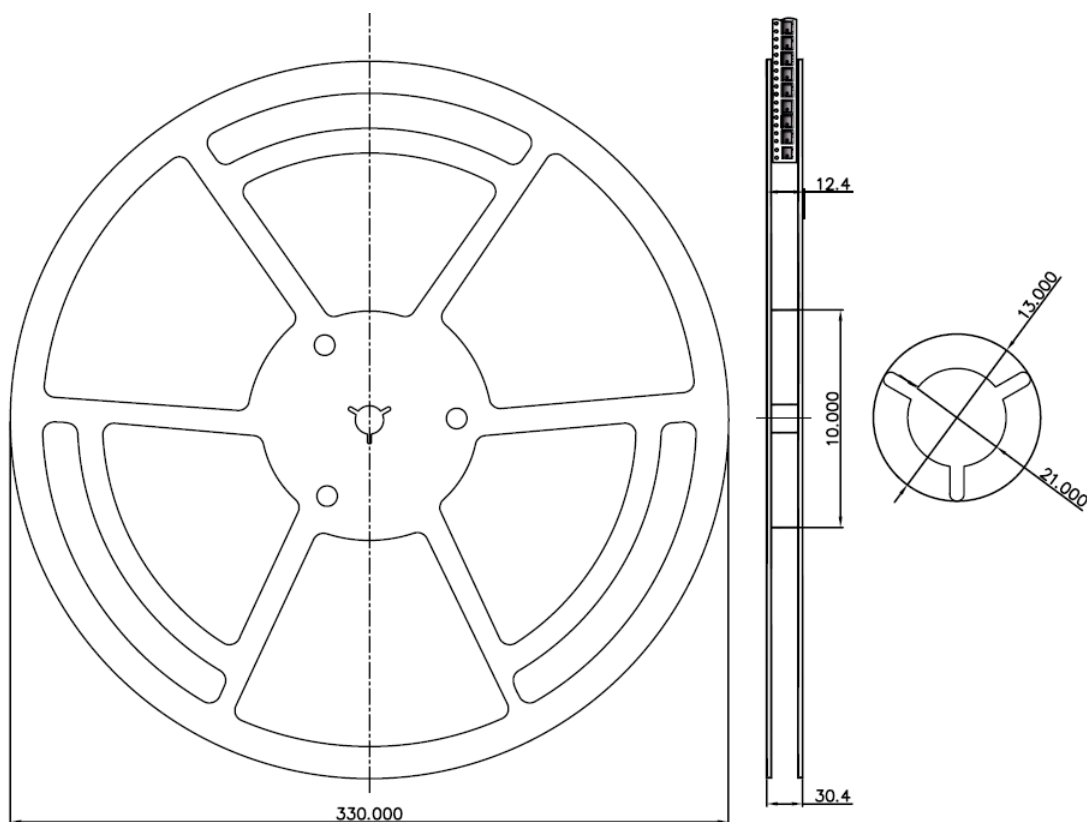
Single Pulse Power Rating, Junction to Case



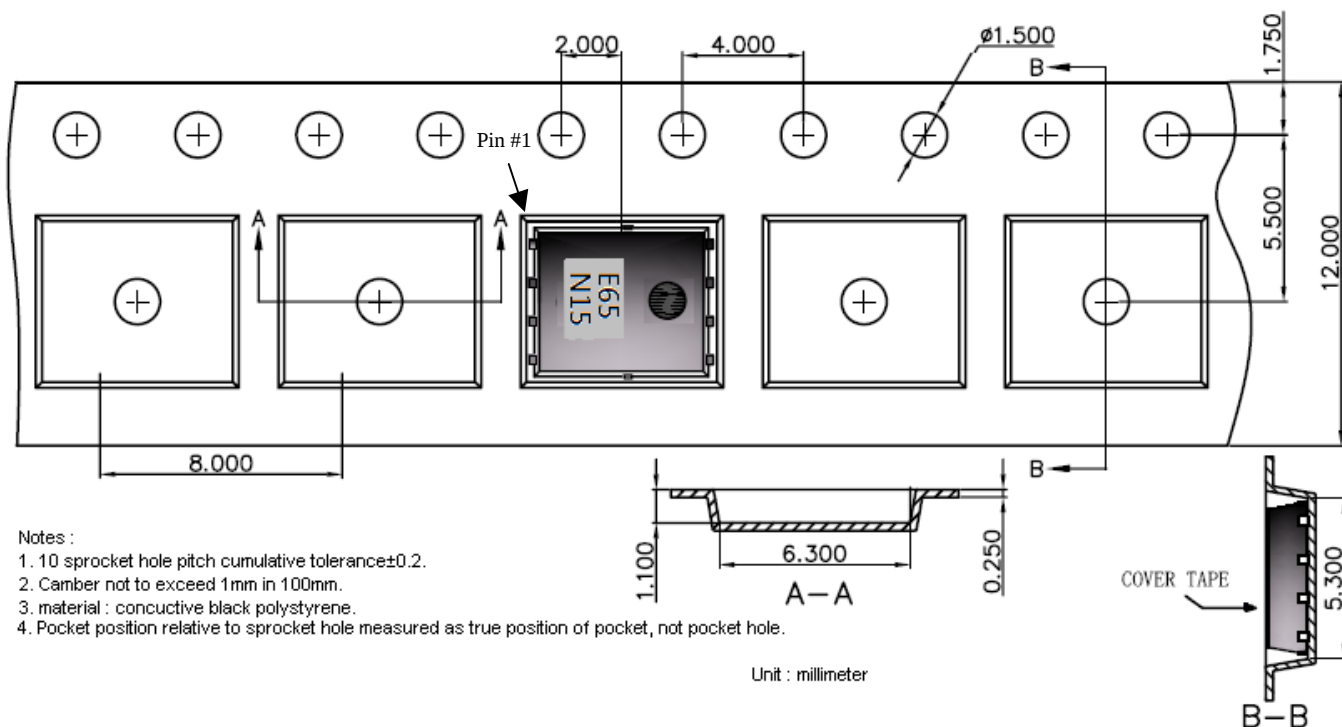
Transient Thermal Response Curves



## Reel Dimension



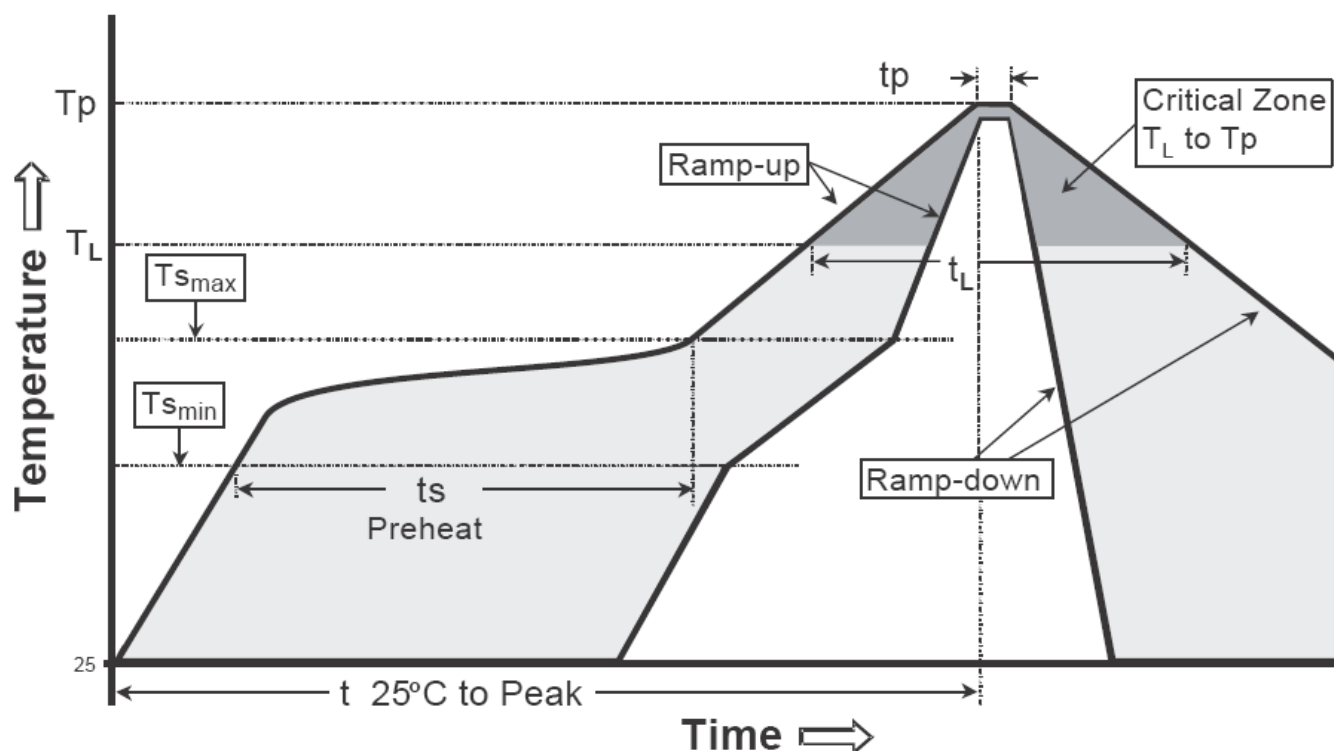
## Carrier Tape Dimension



### Recommended wave soldering condition

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

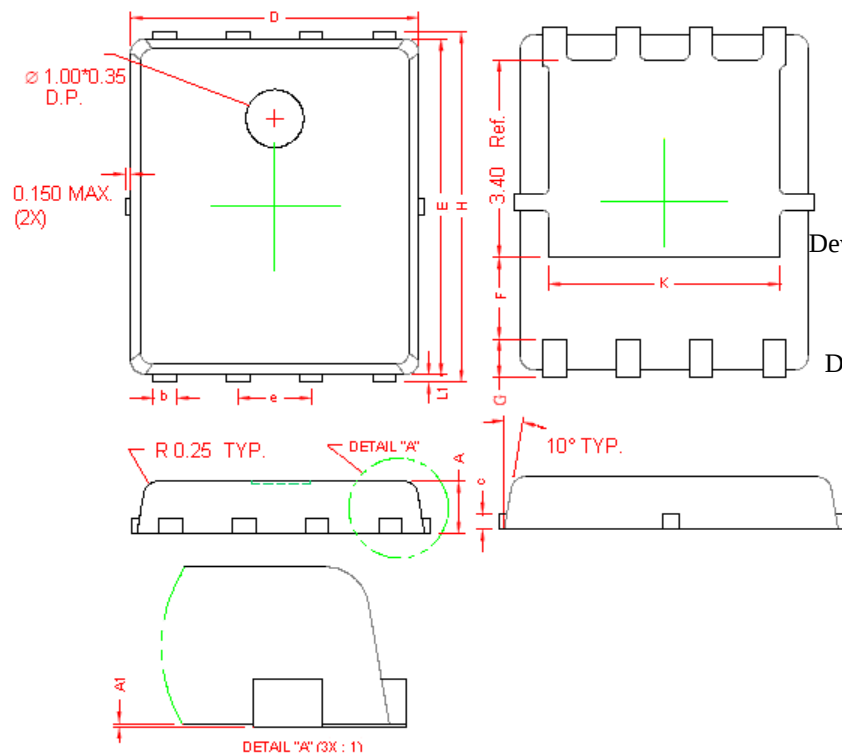
### Recommended temperature profile for IR reflow



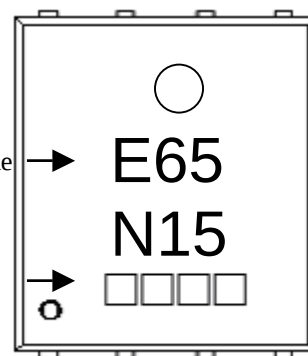
| Profile feature                                     | Sn-Pb eutectic Assembly | Pb-free Assembly |
|-----------------------------------------------------|-------------------------|------------------|
| Average ramp-up rate ( $T_{smax}$ to $T_p$ )        | 3°C/second max.         | 3°C/second max.  |
| Preheat                                             |                         |                  |
| -Temperature Min( $T_{smin}$ )                      | 100°C                   | 150°C            |
| -Temperature Max( $T_{smax}$ )                      | 150°C                   | 200°C            |
| -Time( $t_{smin}$ to $t_{smax}$ )                   | 60-120 seconds          | 60-180 seconds   |
| Time maintained above:                              |                         |                  |
| -Temperature ( $T_L$ )                              | 183°C                   | 217°C            |
| - Time ( $t_L$ )                                    | 60-150 seconds          | 60-150 seconds   |
| Peak Temperature( $T_p$ )                           | 240 +0/-5 °C            | 260 +0/-5 °C     |
| Time within 5°C of actual peak temperature( $t_p$ ) | 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.

## DFN5x6 Dimension



### Marking:



Device Name →

Date Code →

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 : prodcution serial number, 01~99

8-Lead DFN5x6 Plastic Package

Code : H8

| DIM | Millimeters |      | Inches |       | DIM | Millimeters |      | Inches |       |
|-----|-------------|------|--------|-------|-----|-------------|------|--------|-------|
|     | Min.        | Max. | Min.   | Max.  |     | Min.        | Max. | Min.   | Max.  |
| A   | 0.80        | 1.00 | 0.031  | 0.039 | E   | 5.70        | 5.90 | 0.224  | 0.232 |
| A1  | 0.00        | 0.05 | 0.000  | 0.002 | e   | 1.27        | BSC  | 0.050  | BSC   |
| b   | 0.35        | 0.49 | 0.014  | 0.019 | H   | 5.95        | 6.20 | 0.234  | 0.244 |
| c   | 0.254       | REF  | 0.010  | REF   | L1  | 0.10        | 0.18 | 0.004  | 0.007 |
| D   | 4.90        | 5.10 | 0.193  | 0.201 | G   | 0.60        | REF  | 0.024  | REF   |
| F   | 1.40        | REF  | 0.055  | REF   | K   | 4.00        | REF  | 0.157  | REF   |