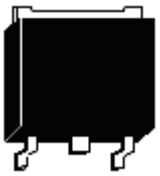
# N-Channel Enhancement Mode Power MOSFET

## Features:

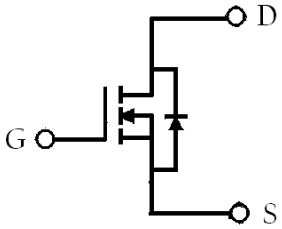
- Low Gate Charge
- Simple Drive Requirement
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

TO-252(DPAK)



G D S

| | | |
|---|---|---|
| $BV_{DSS}$ | | 100V |
| $I_D$@ $T_C$=25°C, $V_{GS}$=10V | | 34A |
| $R_{DSON(TYP)}$ | $V_{GS}$=10V, $I_D$=10A | 20mΩ |
| | $V_{GS}$=4.5V, $I_D$=7A | 25mΩ |




G：Gate D：Drain S：Source

## Ordering Information

| Device | Package | Shipping |
|---|---|---|
| KJB020N10R | TO-252<br>(Pb-free lead plating and halogen-free package) | 2500 pcs / Tape & Reel |

## Absolute Maximum Ratings ($T_C$=25°C, unless otherwise noted)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | |
| Continuous Drain Current @ $T_C$=25°C, $V_{GS}$=10V | $I_D$ | 34 | A |
| Continuous Drain Current @ $T_C$=100°C, $V_{GS}$=10V | | 24 | |
| Continuous Drain Current @ $T_A$=25°C, $V_{GS}$=10V (Note 2) | $I_{DSM}$ | 8.1 | |
| Continuous Drain Current @ $T_A$=70°C, $V_{GS}$=10V (Note 2) | | 6.8 | |
| Continuous Drain Current @ $T_A$=25°C, $V_{GS}$=10V (Note 3) | | 6.6 | |
| Continuous Drain Current @ $T_A$=70°C, $V_{GS}$=10V (Note 3) | | 5.5 | |
| Pulsed Drain Current (Note 1) | $I_{DM}$ | 110 | |
| Avalanche Current @ L=0.1mH | $I_{AS}$ | 22 | |
| Avalanche Energy @ L=1mH, $I_D$=15A, $V_{DD}$=25V | $E_{AS}$ | 112 | mJ |
| Repetitive Avalanche Energy@ L=0.05mH | $E_{AR}$ | 6 | |
| Total Power Dissipation @ $T_C$=25°C | $P_D$ | 60 | W |
| Total Power Dissipation @ $T_C$=100°C | | 30 | |
| Total Power Dissipation @ $T_A$=25°C (Note 2) | $P_{DSM}$ | 2.5 | |
| Total Power Dissipation @ $T_A$=70°C (Note 2) | | 1.0 | |
| Total Power Dissipation @ $T_A$=25°C (Note 3) | | 1.7 | |
| Total Power Dissipation @ $T_A$=70°C (Note 3) | | 0.7 | |
| Operating Junction and Storage Temperature | Tj, Tstg | -55~+175 | °C |

## Thermal Data

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-case, max | $R_{\theta JC}$ | 2.5 | °C/W |
| Thermal Resistance, Junction-to-ambient, max (Note 2) | $R_{\theta JA}$ | 50 | |
| Thermal Resistance, Junction-to-ambient, max (Note 3) | | 75 | |

Note : 1. Pulse width limited by maximum junction temperature
2. When the device is mounted on a 1 in² FR-4 board with 2 oz. copper.
3. When the device is mounted on the minimum pad size recommended.
4. 100% tested by conditions of L=0.1mH, $I_{AS}$=14A, $V_{GS}$=10V, $V_{DD}$=25V.
5. The power dissipation $P_D$ is based on $T_{J(MAX)}$=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
6. The power dissipation $P_{DSM}$ is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

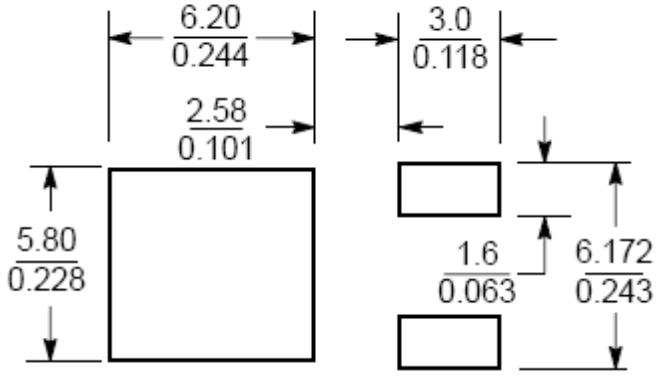
## Characteristics ($T_C$=25°C, unless otherwise specified)

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| **Static** | | | | | |
| $BV_{DSS}$ | 100 | - | - | V | $V_{GS}$=0V, $I_D$=250μA |
| $\Delta BV_{DSS}/\Delta Tj$ | - | 0.1 | - | V/°C | Reference to 25°C, $I_D$=250μA |

| | | | | | |
|---|---|---|---|---|---|
| $V_{GS(th)}$ | 1 | - | 2.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$=250μA |
| $G_{FS}$ | - | 20.5 | - | S | $V_{DS}$ =10V, $I_D$=20A |
| $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |
| $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$ =80V, $V_{GS}$ =0V |
| | - | - | 25 | | $V_{DS}$ =80V, $V_{GS}$ =0V, Tj=125°C |
| *$R_{DS(ON)}$ | - | 20 | 26 | mΩ | $V_{GS}$ =10V, $I_D$=10A |
| | - | 25 | 38 | | $V_{GS}$ =4.5V, $I_D$=7A |
| **Dynamic** | | | | | |
| *Qg | - | 20.9 | - | nC | $I_D$=10A, $V_{DS}$=50V, $V_{GS}$=10V |
| *Qgs | - | 4 | - | | |
| *Qgd | - | 3.5 | - | | |
| *$t_{d(ON)}$ | - | 10.2 | - | ns | $V_{DS}$=50V, $I_D$=10A, $V_{GS}$=10V, $R_G$=1Ω |
| *tr | - | 7.2 | - | | |
| *$t_{d(OFF)}$ | - | 29.4 | - | | |
| *$t_f$ | - | 7.2 | - | | |
| Ciss | - | 1285 | - | pF | $V_{GS}$=0V, $V_{DS}$=50V, f=1MHz |
| Coss | - | 108 | - | | |
| Crss | - | 24 | - | | |
| Rg | - | 1.3 | - | Ω | $V_{GS}$=15mV, $V_{DS}$=0V, f=1MHz |
| **Source-Drain Diode** | | | | | |
| *$I_S$ | - | - | 34 | A | |
| *$I_{SM}$ | - | - | 110 | | |
| *$V_{SD}$ | - | 0.86 | 1.2 | V | $I_S$=10A, $V_{GS}$=0V |
| *trr | - | 29.1 | - | ns | $I_F$=10A, $V_{GS}$=0V, $dI_F/dt$=100A/μs |
| *Qrr | - | 36.5 | - | nC | |

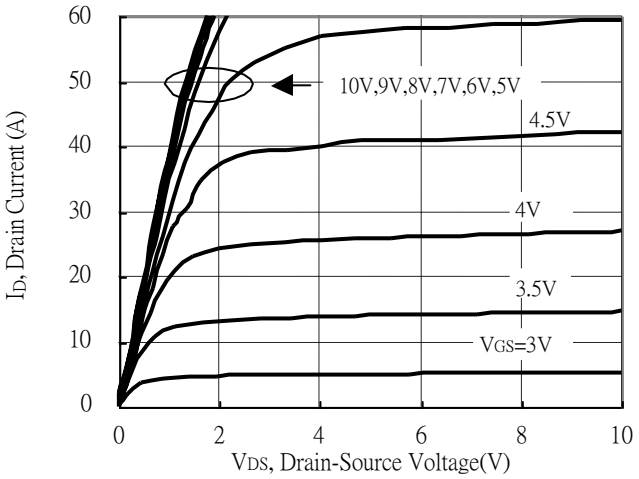
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

## Recommended soldering footprint

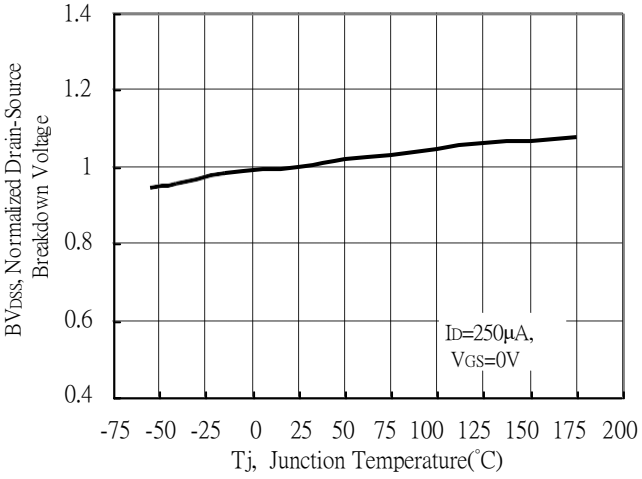


## Typical Characteristics

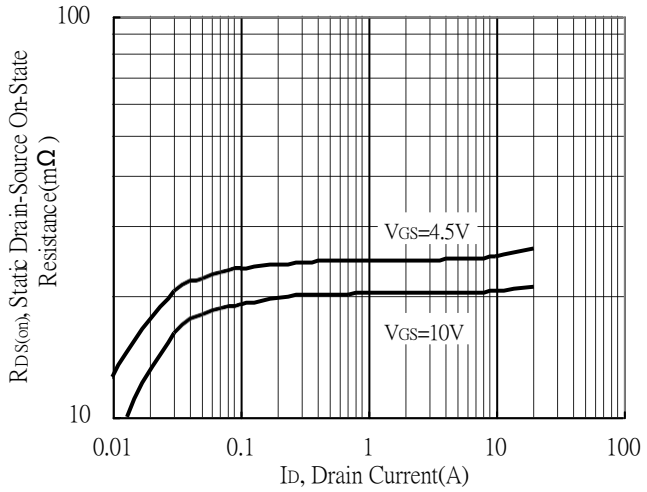
Typical Output Characteristics



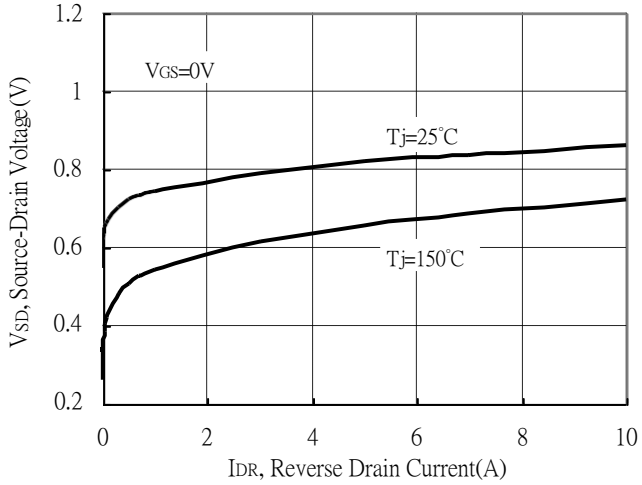

Brekdown Voltage vs Ambient Temperature



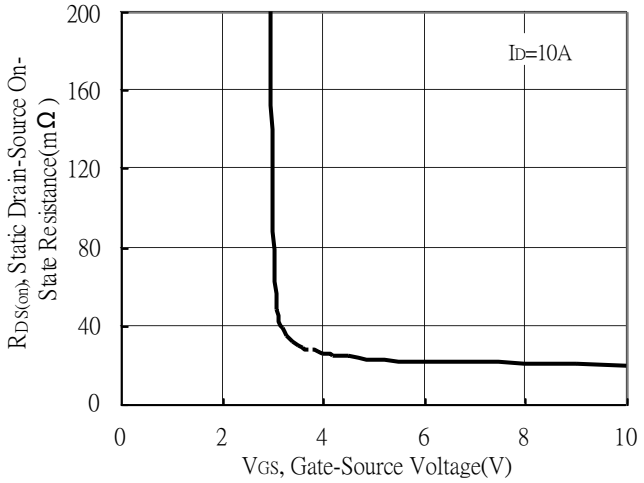

Static Drain-Source On-State resistance vs Drain Current



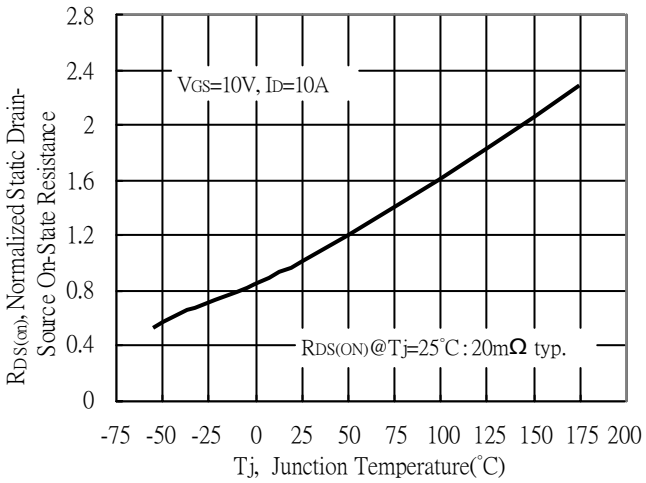

Reverse Drain Current vs Source-Drain Voltage




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

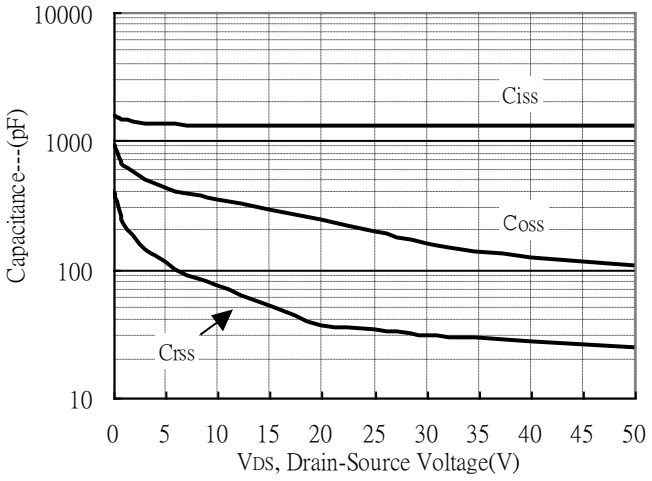



Drain-Source On-State Resistance vs Junction Tempearture

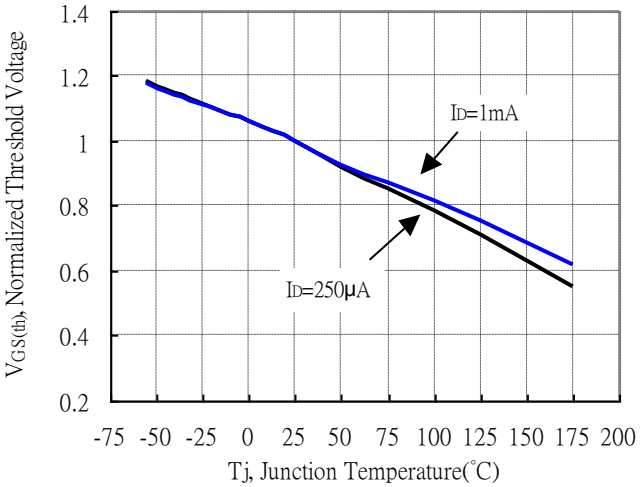


## Typical Characteristics (Cont.)

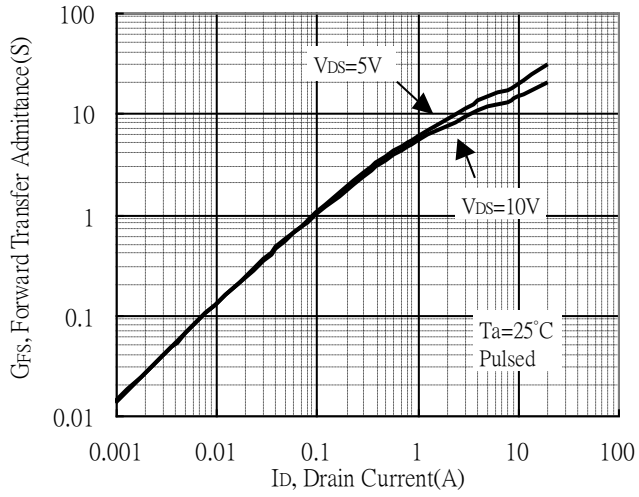
Capacitance vs Drain-to-Source Voltage



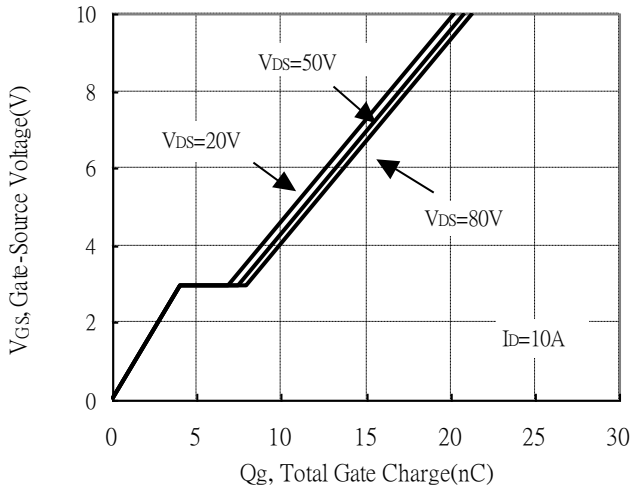

Threshold Voltage vs Junction Tempearture



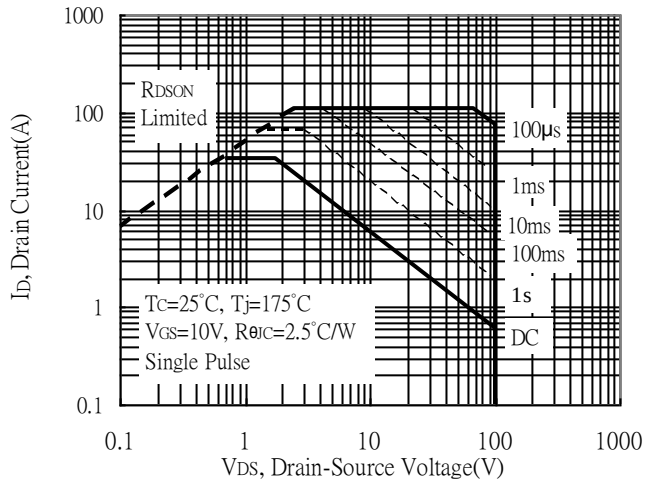

Forward Transfer Admittance vs Drain Current



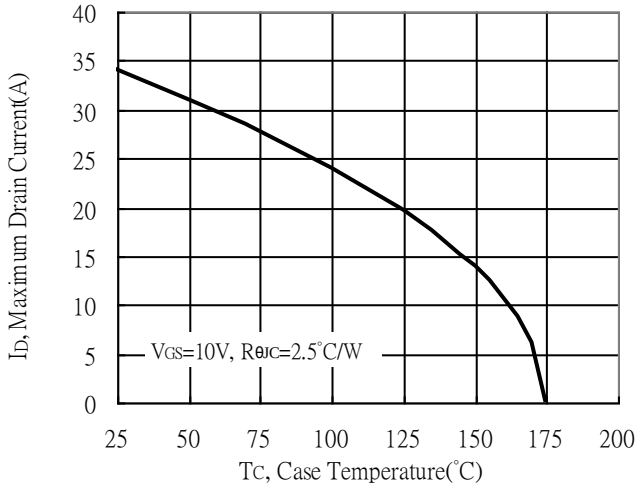

Gate Charge Characteristics




Maximum Safe Operating Area

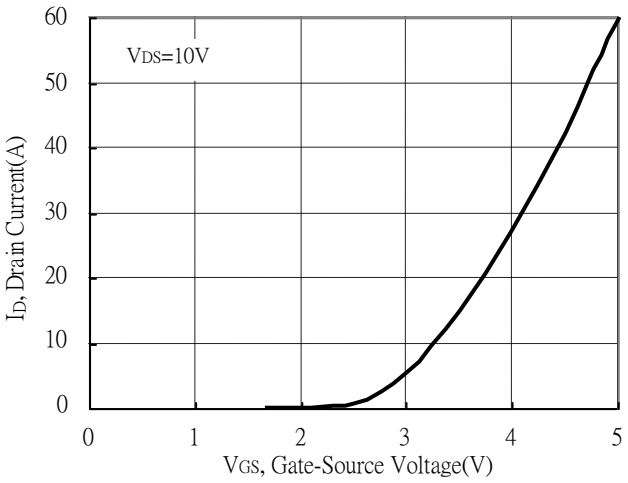



Maximum Drain Current vs Case Temperature

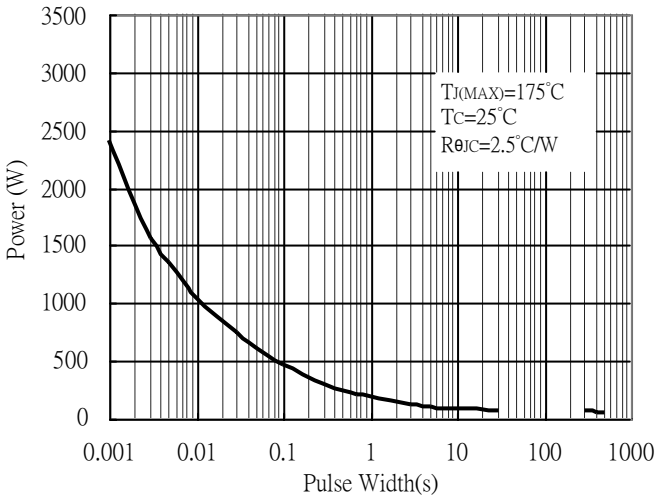


## Typical Characteristics (Cont.)

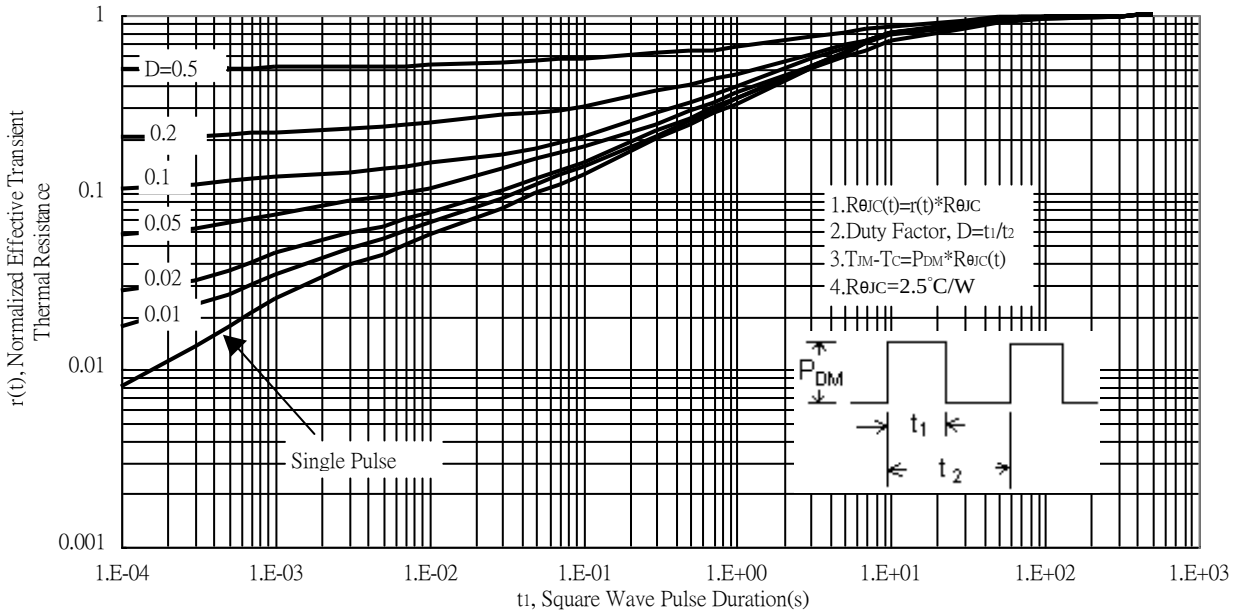
Typical Transfer Characteristics



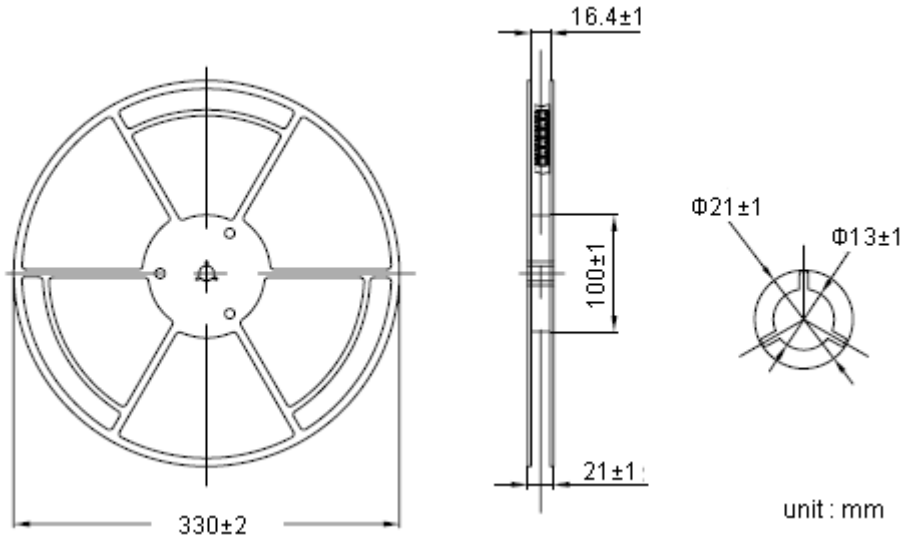

Single Pulse Power Rating, Junction to Case



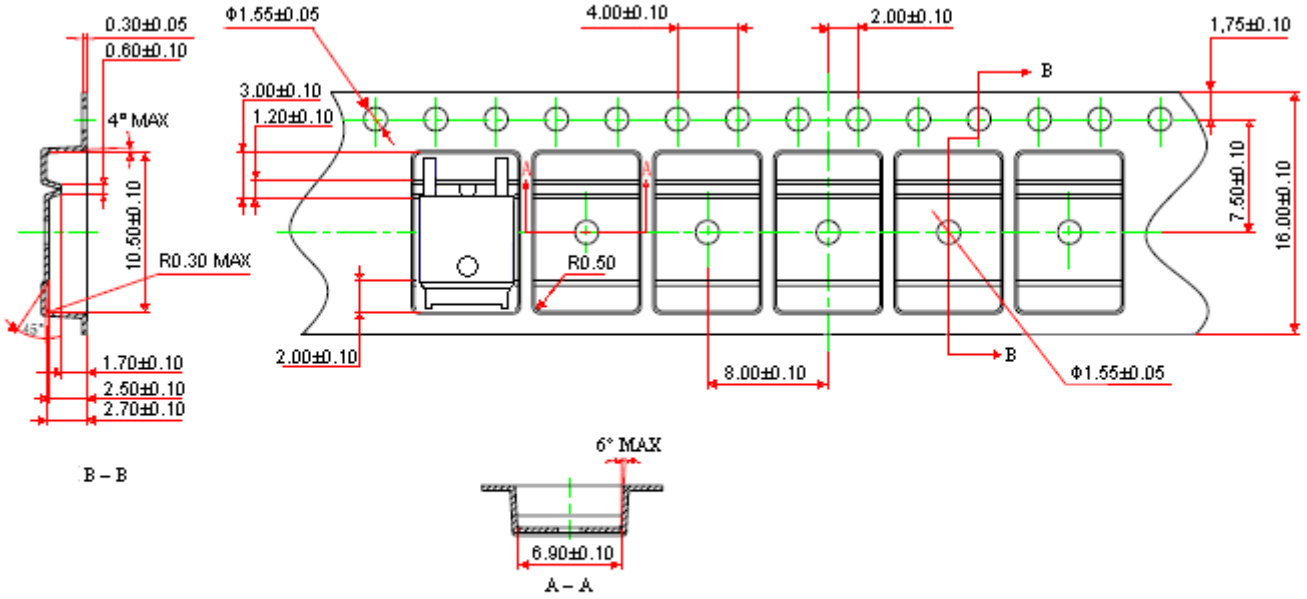

Transient Thermal Response Curves



## Reel Dimension

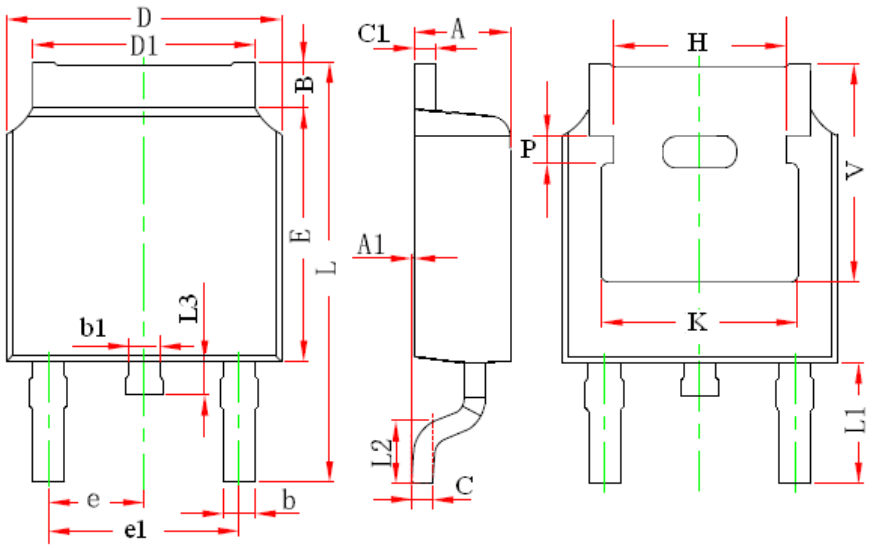



## Carrier Tape Dimension



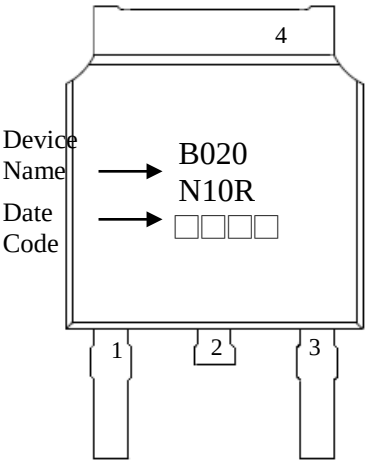

Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : $10^{5}$ Ω/□~ $10^{11}$ Ω/□ unit : mm

## TO-252 Dimension




3-Lead TO-252 Plastic Surface Mount Package

Marking:




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

| 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 |