## N-Channel Enhancement Mode Power MOSFET

# MTA50N15J3

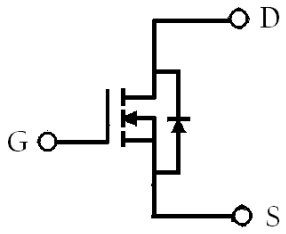
| | |
|---|---|
| **$BV_{DSS}$** | **150V** |
| **$I_D$@$T_C$=25°C, $V_{GS}$=10V** | **27A** |
| **$R_{DS(ON)}$@$V_{GS}$=10V, $I_D$=15A** | **44.3 mΩ(typ)** |
| **$R_{DS(ON)}$@$V_{GS}$=4.5V, $I_D$=10A** | **43.0 mΩ(typ)** |

## Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

## Symbol

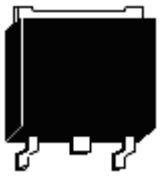
MTA50N15J3




G：Gate D：Drain S：Source

## Outline

TO-252(DPAK)



G D S

## Ordering Information

| Device | Package | Shipping |
|---|---|---|
| MTA50N15J3-0-T3-X | TO-252<br>(Pb-free lead plating package) | 2500 pcs / Tape & Reel |

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T3 : 2500 pcs / tape & reel, 13” reel

Product rank, zero for no rank products

Product name

## Absolute Maximum Ratings ($T_C$=25°C)

| Parameter | | | Symbol | Limits | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage (Note 1) | | | $V_{DS}$ | 150 | V |
| Gate-Source Voltage | | | $V_{GS}$ | ±20 | |
| Continuous Drain Current @$T_C$=25°C, $V_{GS}$=10V | | (Note 1) | $I_D$ | 27 | A |
| Continuous Drain Current @$T_C$=100°C, $V_{GS}$=10V | | (Note 1) | | 19 | |
| Continuous Drain Current @$T_A$=25°C, $V_{GS}$=10V | | (Note 4) | $I_{DSM}$ | 4.0 | |
| Continuous Drain Current @$T_A$=70°C, $V_{GS}$=10V | | (Note 4) | | 3.2 | |
| Pulsed Drain Current @ $V_{GS}$=10V | | (Note 3) | $I_{DM}$ | 100 | |
| Avalanche Current @L=0.1mH | | (Note 3) | $I_{AS}$ | 13 | |
| Single Pulse Avalanche Energy @ L=1mH, $I_D$=13 Amps, $V_{DD}$=50V | | (Note 5) | $E_{AS}$ | 84 | mJ |
| Power Dissipation | $T_C$=25°C | (Note 1) | $P_D$ | 100 | W |
| | $T_C$=100°C | (Note 1) | | 50 | |
| | $T_A$=25°C | (Note 2) | $P_{DSM}$ | 2 | |
| | $T_A$=70°C | (Note 2) | | 1.3 | |
| Operating Junction and Storage Temperature | | | Tj, Tstg | -55~+175 | °C/W |

*Drain current limited by maximum junction temperature

## Thermal Data

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-case, max | $R_{th,j-c}$ | 1.5 | °C/W |
| Thermal Resistance, Junction-to-ambient, max (Note2) | $R_{th,j-a}$ | 62.5 | |
| Thermal Resistance, Junction-to-ambient, max (Note4) | | 90 | |

Note : 1. 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.

2. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with $T_A$=25°C. 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.

3. Pulse width limited by junction temperature $T_{J(MAX)}$=175°C. Ratings are based on low frequency and low duty cycles to keep initial $T_J$=25°C.

4. When mounted on the minimum pad size recommended (PCB mount), t≤10s.

5. 100% tested by conditions of L=0.1mH, $I_{AS}$=5A, $V_{GS}$=10V, $V_{DD}$=25V

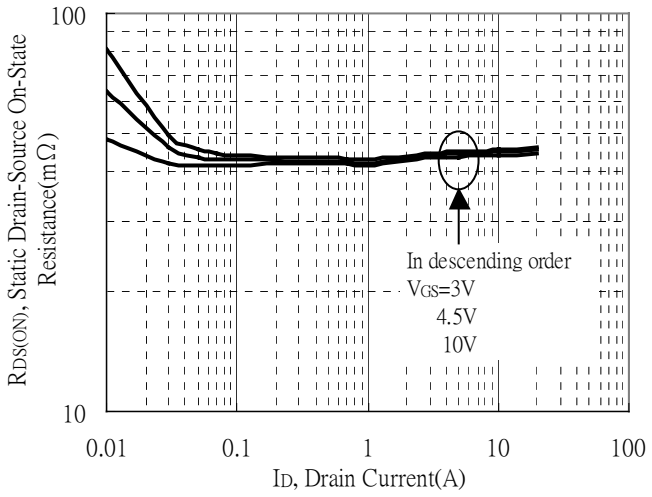
## Characteristics (Tj=25°C, unless otherwise specified)

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| **Static** | | | | | |
| $BV_{DSS}$ | 150 | - | - | V | $V_{GS}$=0V, $I_D$=250μA |
| $\Delta BV_{DSS}/\Delta Tj$ | - | 0.1 | - | V/°C | Reference to 25°C, $I_D$=250μA |
| $V_{GS(th)}$ | 0.5 | - | 1.2 | V | $V_{DS}$ = $V_{GS}$, $I_D$=250μA |
| *$G_{FS}$ | - | 43.5 | - | S | $V_{DS}$ =10V, $I_D$=10A |
| $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±20V |
| $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$ =120V, $V_{GS}$ =0V |
| | - | - | 25 | | $V_{DS}$ =120V, $V_{GS}$ =0V, Tj=125°C |
| *$R_{DS(ON)}$ | - | 44.3 | 56 | mΩ | $V_{GS}$ =10V, $I_D$=15A |
| | - | 43.0 | 56 | | $V_{GS}$ =4.5V, $I_D$=10A |
| **Dynamic** | | | | | |
| *Qg | - | 69.9 | - | nC | $I_D$=15A, $V_{DS}$=120V, $V_{GS}$=10V |
| *Qgs | - | 3.8 | - | | |
| *Qgd | - | 12.5 | - | | |
| *$t_{d(ON)}$ | - | 11.6 | - | ns | $V_{DS}$=75V, $I_D$=15A, $V_{GS}$=10V, $R_G$=6Ω |
| *tr | - | 21 | - | | |
| *$t_{d(OFF)}$ | - | 108.2 | - | | |
| *$t_f$ | - | 83.8 | - | | |
| Ciss | - | 2161 | - | pF | $V_{GS}$=0V, $V_{DS}$=80V, f=1MHz |
| Coss | - | 96 | - | | |
| Crss | - | 19 | - | | |
| Rg | - | 1 | - | Ω | f=1MHz |
| **Source-Drain Diode** | | | | | |
| *$I_S$ | - | - | 27 | A | |
| *$I_{SM}$ | - | - | 100 | | |
| *$V_{SD}$ | - | 0.8 | 1.2 | V | $I_S$=15A, $V_{GS}$=0V |
| *trr | - | 41 | - | ns | $V_{GS}$=0V, $I_F$=15A, $dI_F/dt$=100A/μs |
| *Qrr | - | 85 | - | nC | |

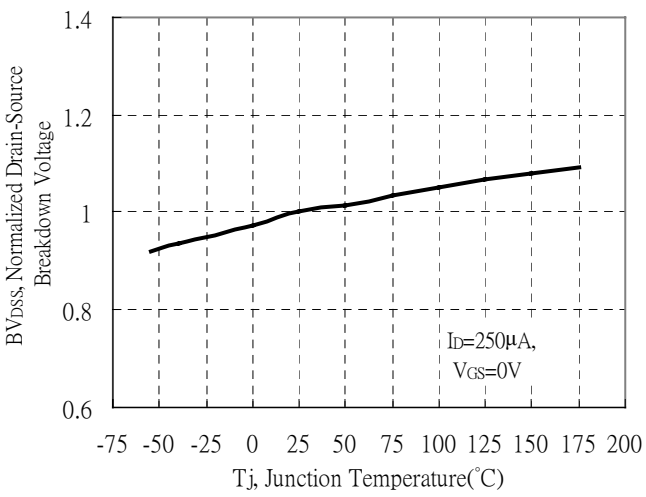
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

## Typical Characteristics

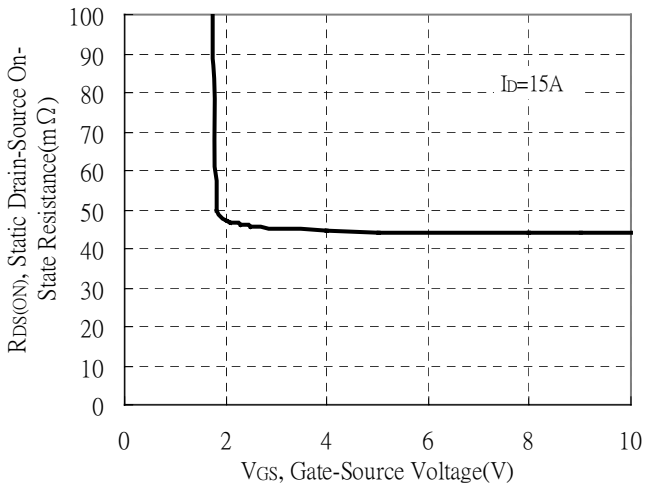
Static Drain-Source On-State resistance vs Drain Current



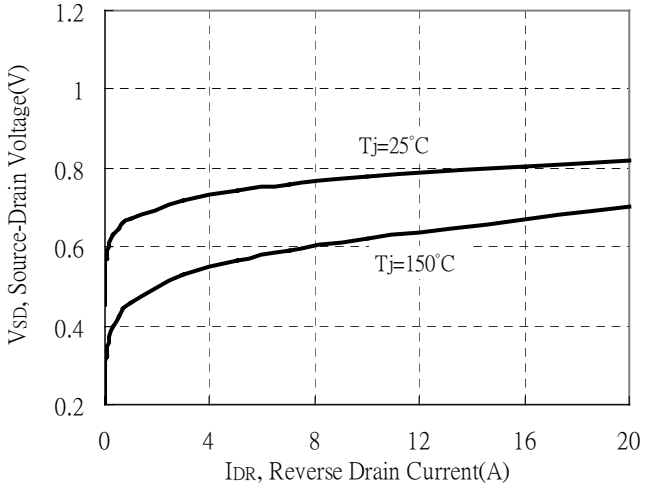

Brekdown Voltage vs Ambient Temperature



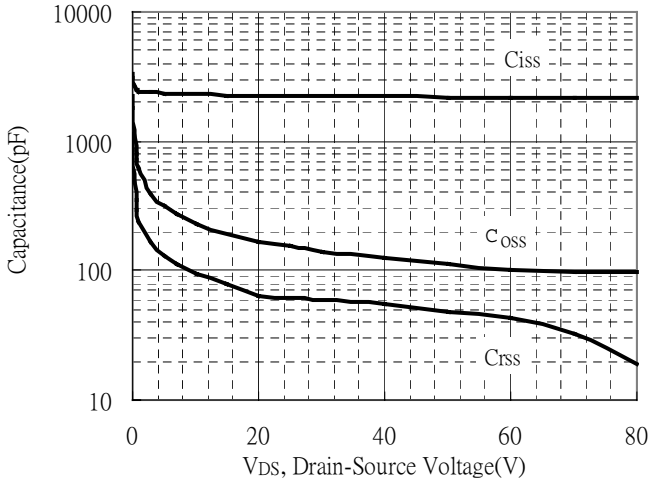

Static Drain-Source On-State Resistance vs Gate-Source Voltage



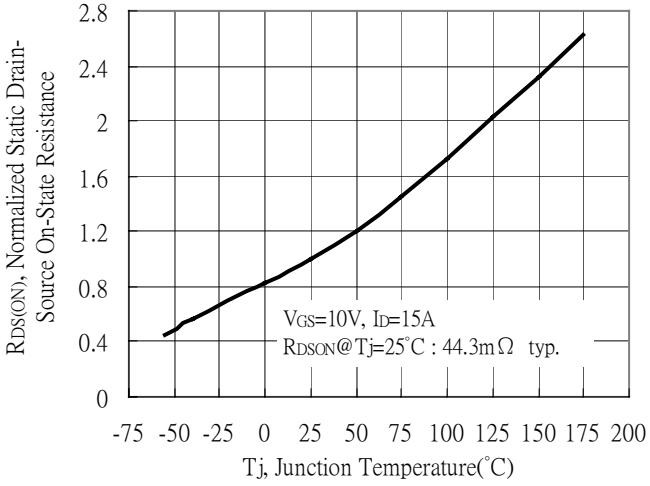

Reverse Drain Current vs Source-Drain Voltage




Capacitance vs Drain-to-Source Voltage

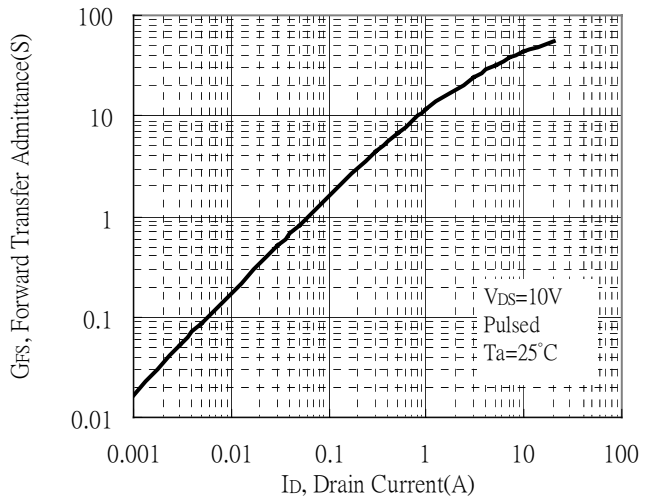



Drain-Source On-State Resistance vs Junction Tempearture

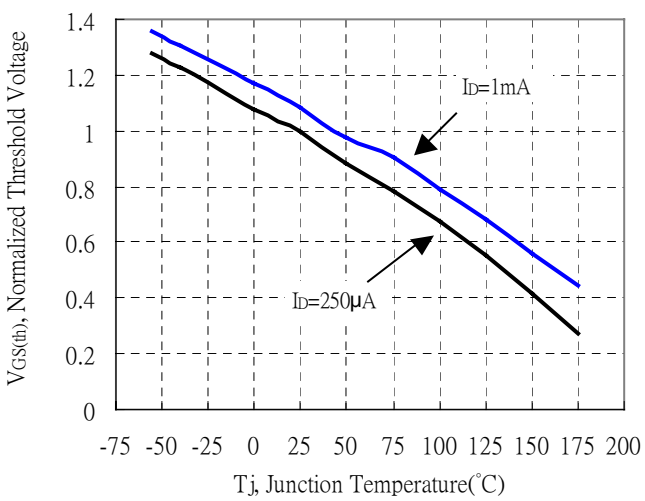


## Typical Characteristics(Cont.)

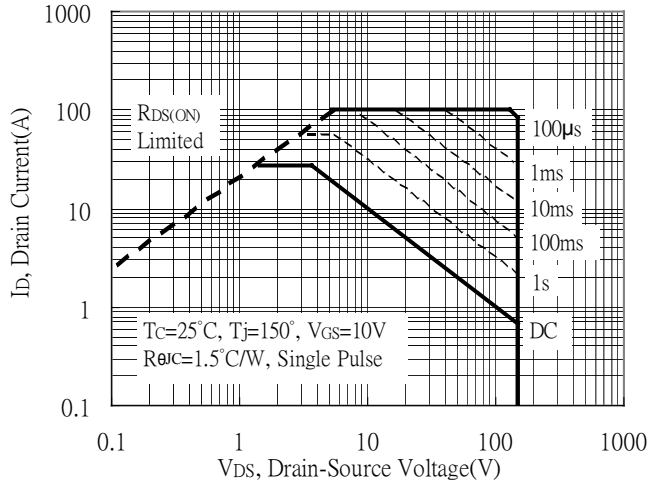
Forward Transfer Admittance vs Drain Current



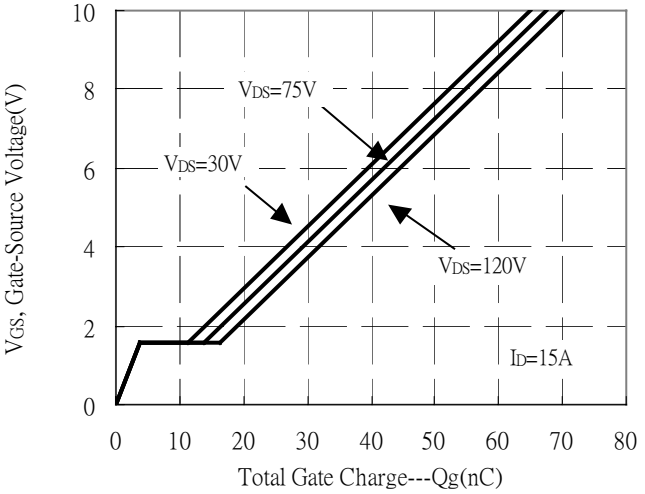

NormalizedThreshold Voltage vs Junction Tempearture



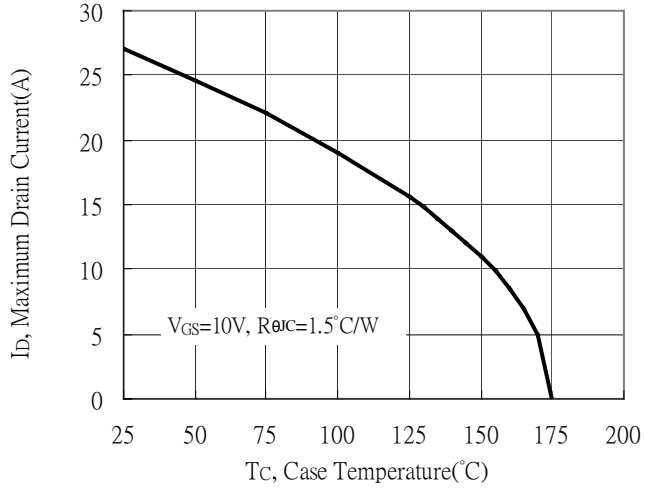

Maximum Safe Operating Area



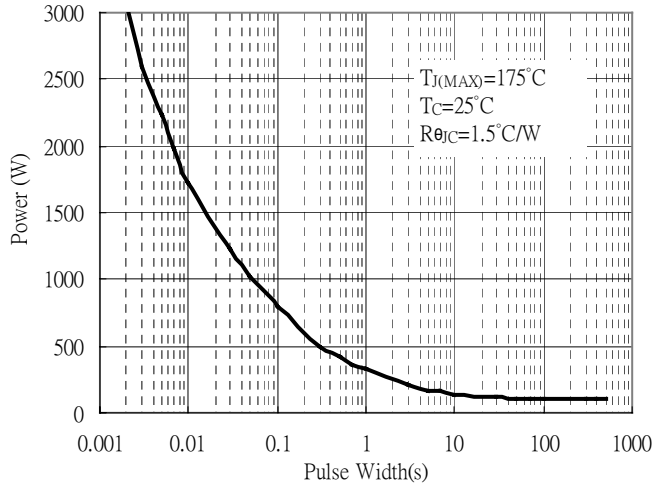

Gate Charge Characteristics



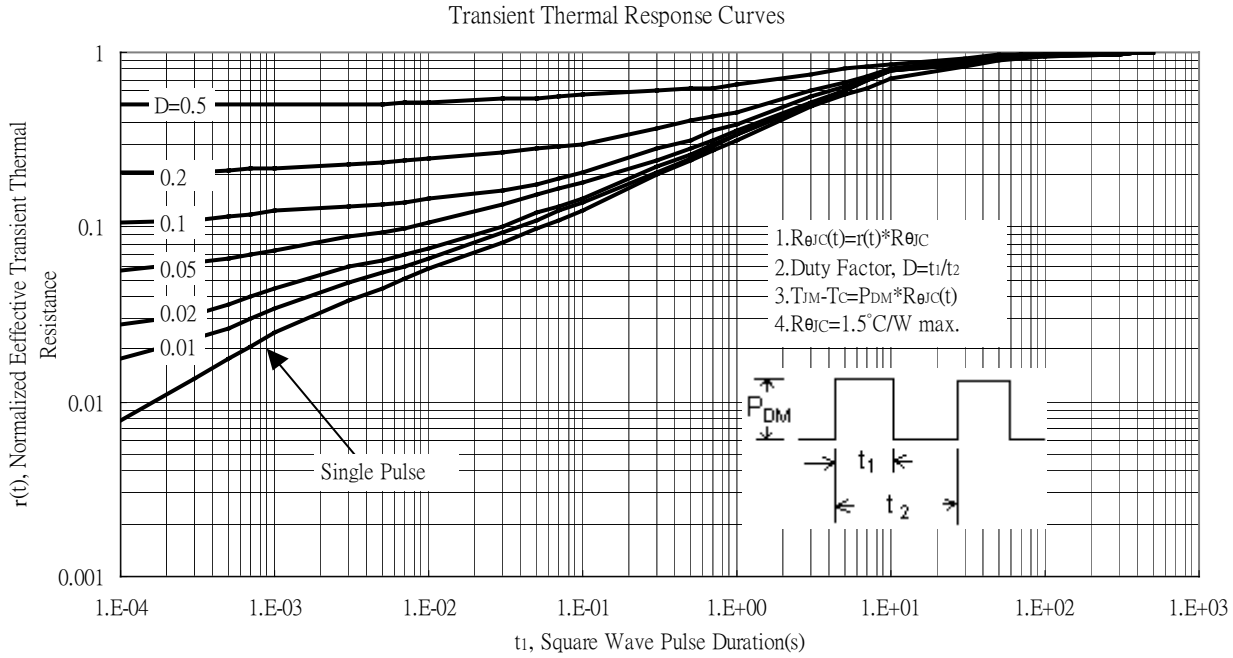

Maximum Drain Current vs Case Temperature



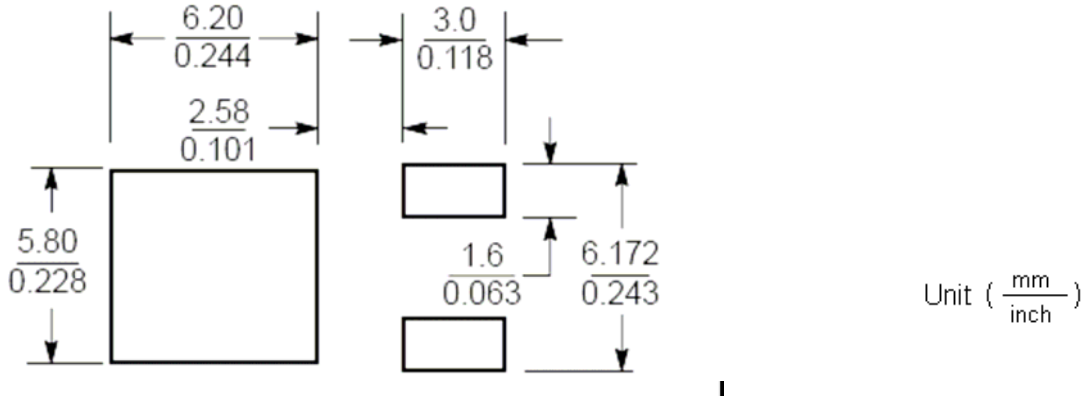

Single Pulse Maximum Power Dissipation



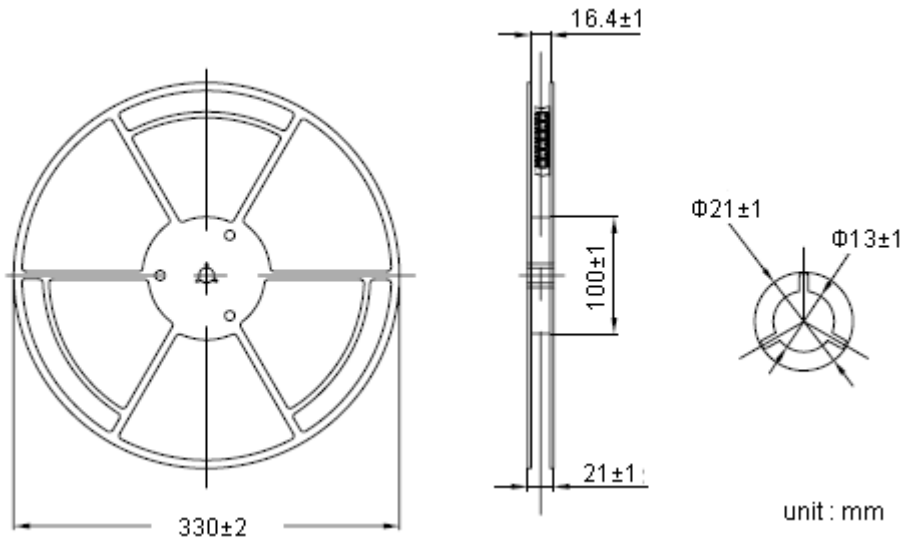
## Typical Characteristics(Cont.)



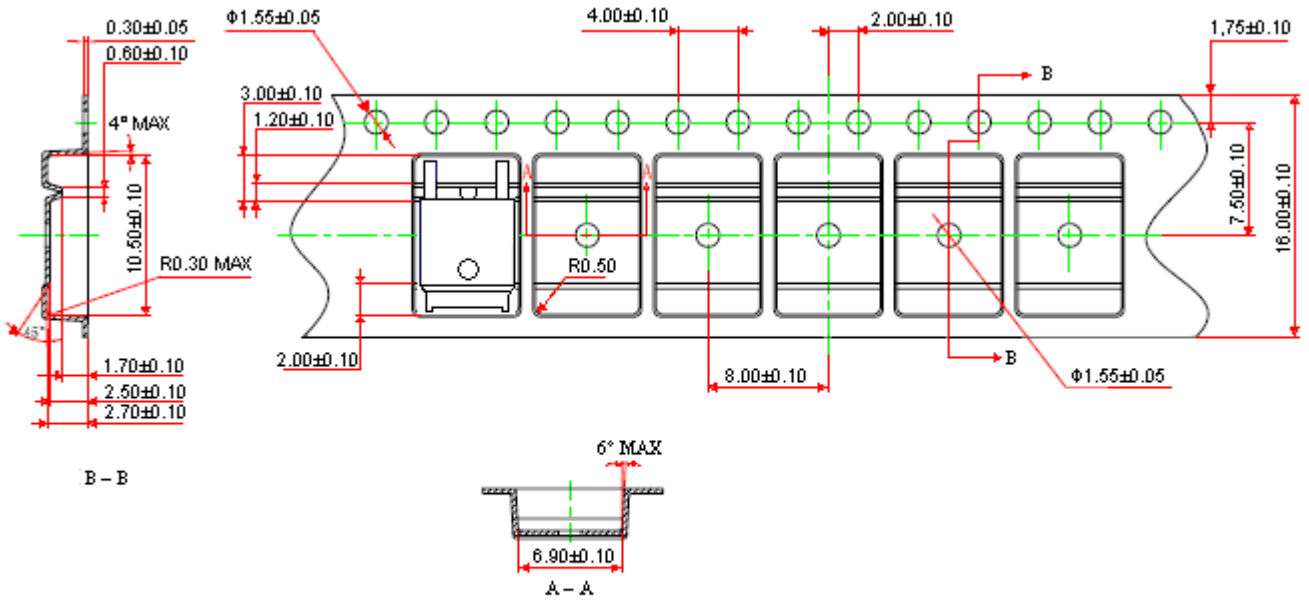

## Recommended soldering footprint



## Reel Dimension




## Carrier Tape Dimension

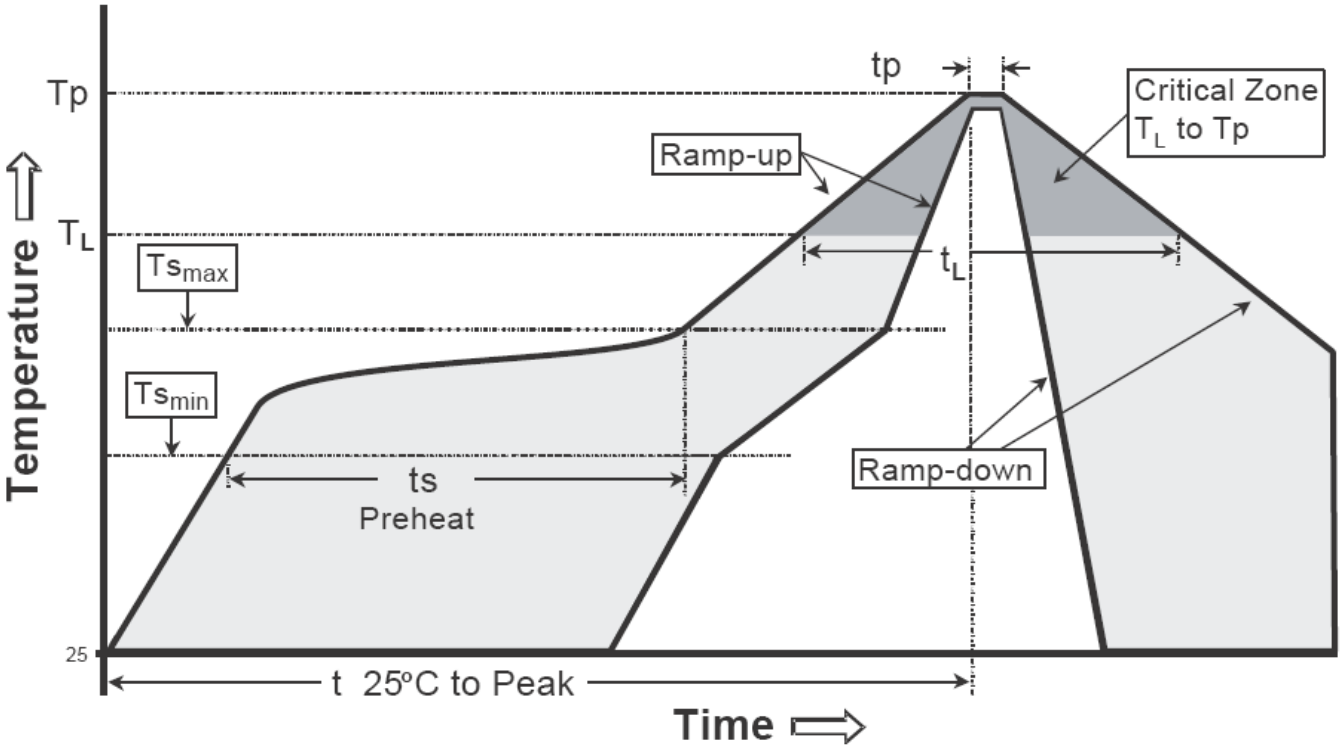



Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : $10^{5}$ Ω/□~ $10^{11}$ Ω/□ unit : mm

## Recommended wave soldering condition

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

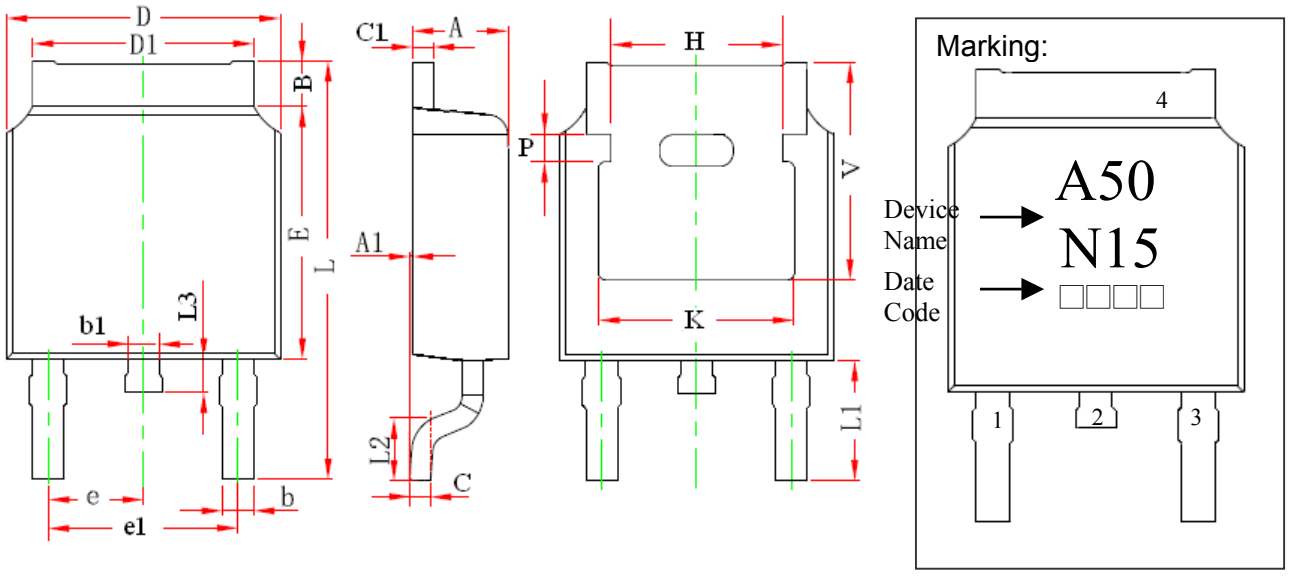
## Recommended temperature profile for IR reflow




| Profile feature | Sn-Pb eutectic Assembly | Pb-free Assembly |
|---|---|---|
| Average ramp-up rate (Tsmax to Tp) | 3°C/second max. | 3°C/second max. |
| Preheat<br>−Temperature Min(Ts min)<br>−Temperature Max(Ts max)<br>−Time(ts min to ts max) | <br>100°C<br>150°C<br>60-120 seconds | <br>150°C<br>200°C<br>60-180 seconds |
| Time maintained above:<br>−Temperature (TL)<br>− Time (tL) | <br>183°C<br>60-150 seconds | <br>217°C<br>60-150 seconds |
| Peak Temperature(TP) | 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




3-Lead TO-252 Plastic Surface Mount Package
CYStek Package Code: J3

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

Date Code(counting from left to right) :
1st code: year code, the last digit of Christian year
2nd 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
3rd and 4th codes : prodcution 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 | 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: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.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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