# DOINGTER

# DB5R5N2G

## Description：

This N-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety of applications.

## Features：

1) $V_{DS}$=20V,$I_D$=60A,$R_{DS(ON)}$<5.5m$\Omega$ @$V_{GS}$=4.5V（Typ：4.2m$\Omega$）

2) Low gate charge.

3) Green device available.

4) Advanced high cell denity trench technology for ultra low $R_{DS(ON)}$.

5) Excellent package for good heat dissipation.

6) MSL3
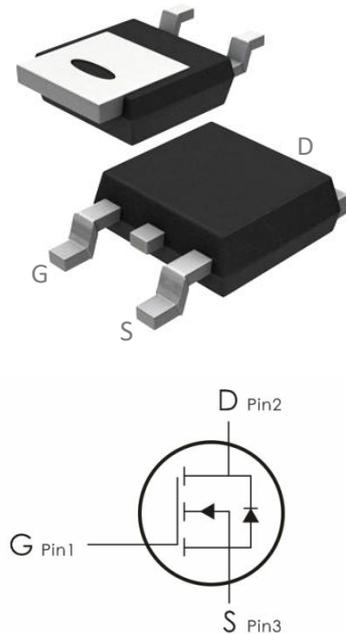


## Package Marking and Ordering Information：

| Part NO. | Marking | Package | Packing |
|---|---|---|---|
| DB5R5N2G | B5R5N2 | TO- 252 | 2500 pcs/Reel |

## Absolute Maximum Ratings： (T_C=25℃ unless otherwise noted)

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 20 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$ | Continuous Drain Current[1] | 60 | A |
| | Continuous Drain Current-$T_C$=100℃[1] | 42 | |
| $I_{DM}$ | Pulsed Drain Current[2] | 240 | |
| $P_D$ | Power Dissipation | 33 | W |
| $E_{AS}$ | Single pulse avalanche energy[3] | 49 | mJ |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -55-+150 | ℃ |

## Thermal Characteristics：

| Symbol | Parameter | Max | Units |
|---|---|---|---|
| $R_{\Theta JC}$ | Thermal Resistance,Junction to Case | 3.82 | ℃/W |
| $R_{\Theta JA}$ | Thermal Resistance,Junction to Ambient | 62 | ℃/W |

## Electrical Characteristics： ($T_C$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Sourtce Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | 20 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$=0V, $V_{DS}$=20V | --- | --- | 1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±12V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 0.5 | 0.7 | 1.0 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance[4] | $V_{GS}$=4.5V,$I_D$=20A | --- | 4.2 | 5.5 | mΩ |
| | | $V_{GS}$=2.5V,$I_D$=10A | --- | 5.9 | 7.5 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | | --- | 1862 | --- | |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=10V, $V_{GS}$=0V, f=500KHz | --- | 267 | -- | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 224 | --- | |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | | --- | 13 | --- | ns |
| $t_r$ | Rise Time | $V_{DS}$=16V, $I_D$=32A, | --- | 48 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | $R_{ENG}$=1.5Ω ,$V_{GS}$=4.5V | --- | 57 | --- | ns |
| $t_f$ | Fall Time | | --- | 89 | --- | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$=4.5V, $V_{DS}$=16V, | --- | 25 | --- | nC |
| $Q_{gs}$ | Gate-Source  Charge | $I_D$=32A | --- | 4 | --- | nC |
| $Q_{gd}$ | Gate-Drain "Miller" Charge | | --- | 11.5 | --- | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V, $I_{SD}$=20A | --- | --- | 1.1 | V |
| $I_S$ | Continuous Drain Curren | | --- | --- | 60 | A |
| $I_{SM}$ | Pulsed Drain Current | $V_D$=$V_G$=0V | --- | --- | 240 | A |
| $T_{rr}$ | Reverse Recovery Time | $I_F$=32A, | --- | 43 | --- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | dI/dt=100A/us | --- | 0.03 | --- | μC |

## Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=10V,$V_G$=4.5V,L=0.5mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Characteristics： (T$_C$=25℃ unless otherwise noted)
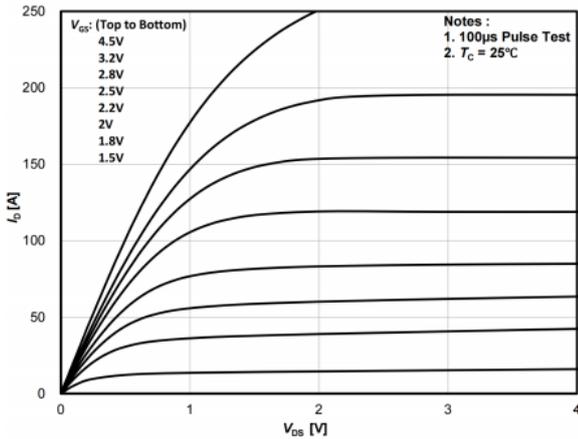


Figure 1. **On-Region Characteristics**
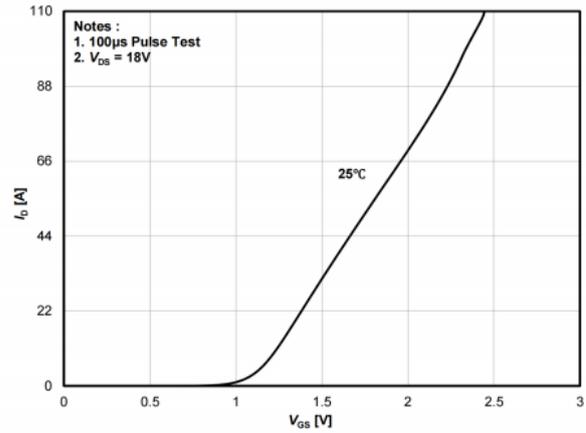


Figure 2. **Transfer Characteristics**
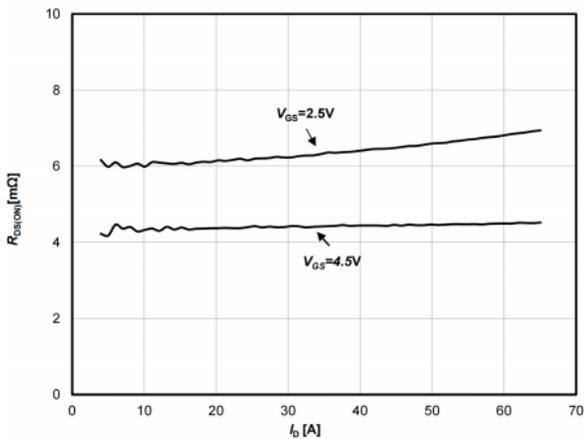


Figure 3. **On Resistance vs. Drain Current**
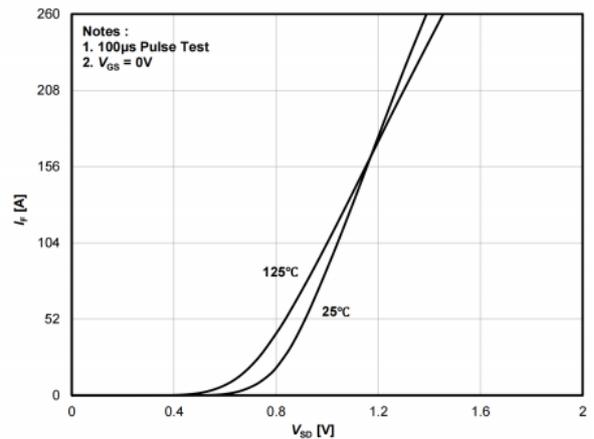


Figure 4. **Diode Forward Voltage vs. Current**
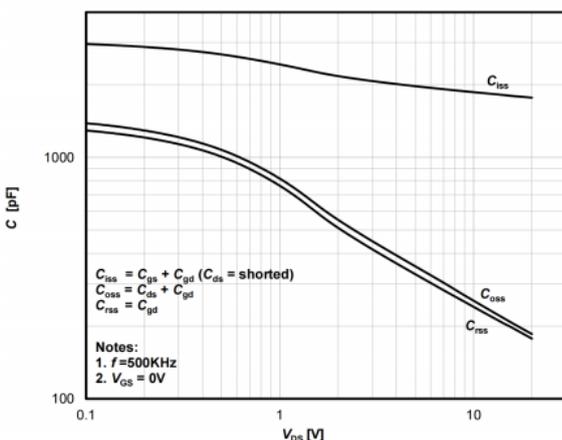


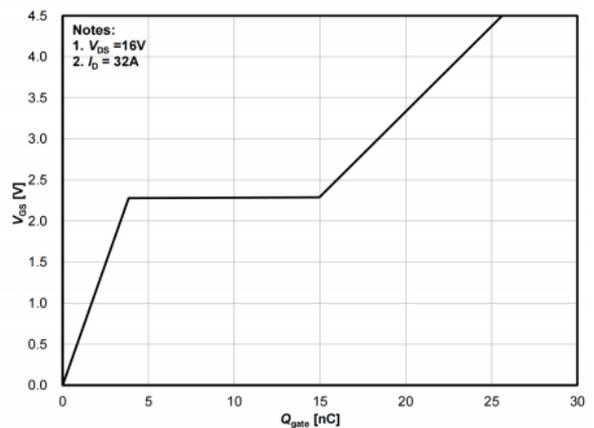Figure 5. **Capacitance Characteristics**


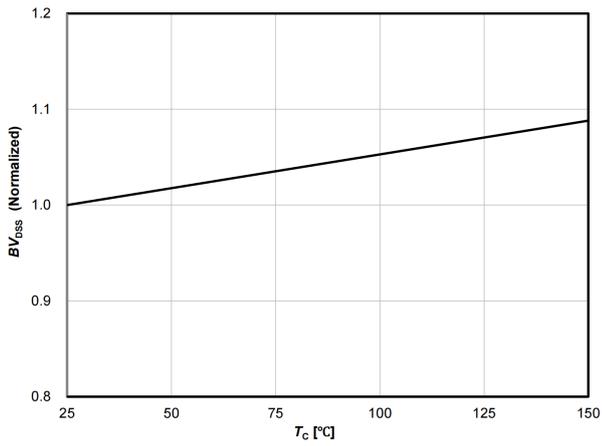
Figure 6. **Gate Charge Characteristics**

Figure 7. **Normalized $BV_{DSS}$ vs. Temperature**
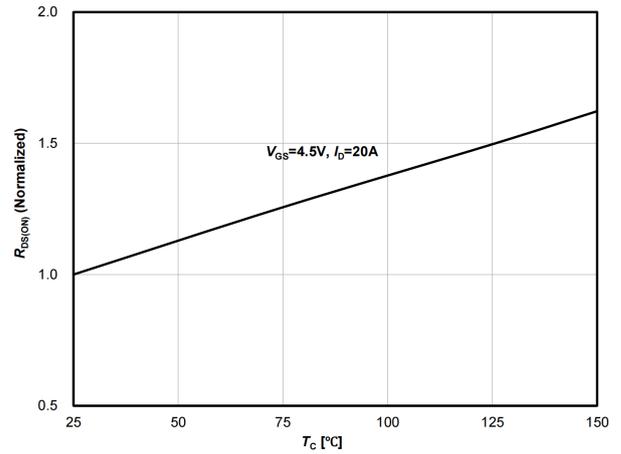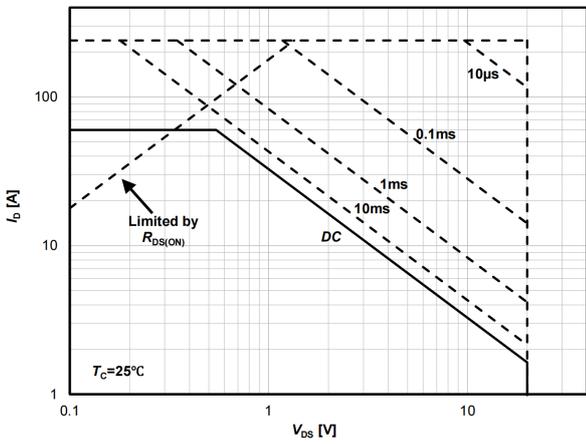


Figure 8. **Normalized On-Resistance Variation vs. Temperature**
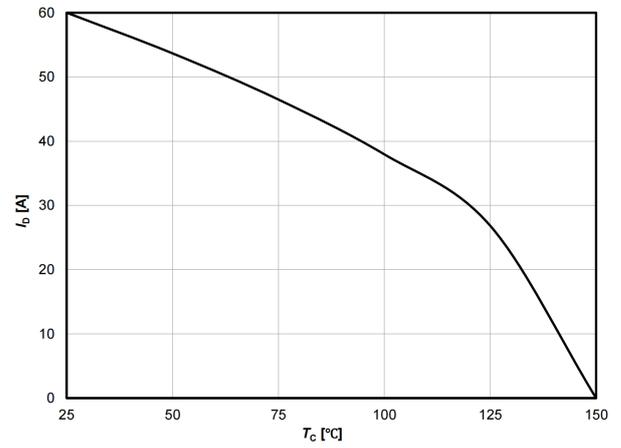


Figure 9. **Safe Operating Area** [3)]



Figure 10. **Drain Current vs. Temperature**



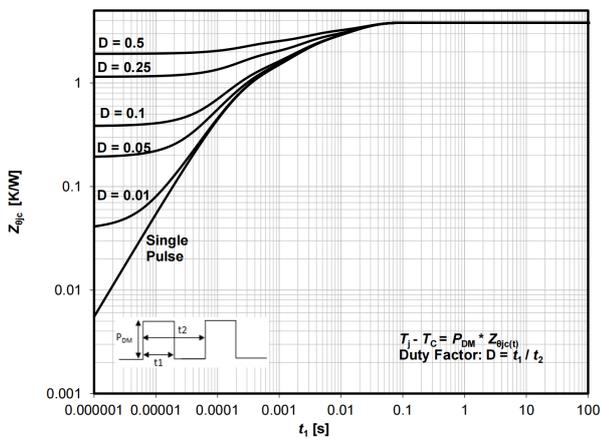$T_J - T_C = P_{DM} * Z_{\theta jc(t)}$
Duty Factor: $D = t_1 / t_2$

Figure 11. **Transient Thermal Impedance**

# TO-252  Package Information

**Package Outline Type-A**

UNIT : mm



Top View

Side View

Detail A

Bottom View

Front View

Detail A
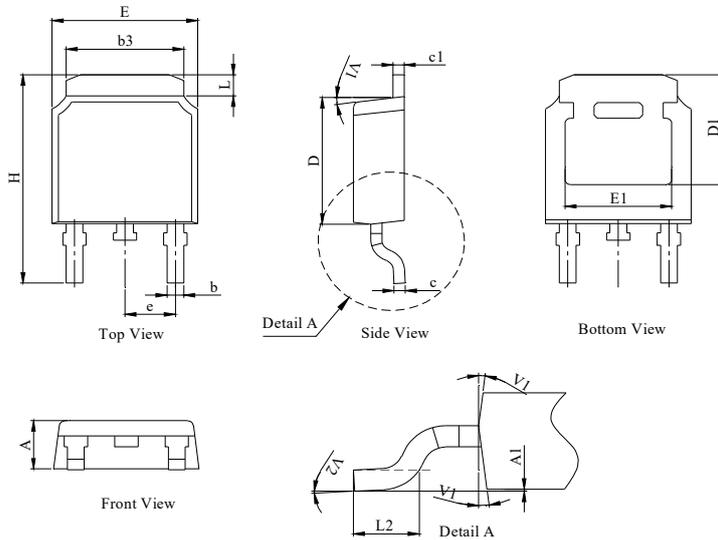
| DIM. | MILLIMETER | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 2.18 | 2.30 | 2.39 |
| A1 | 0 | -- | 0.13 |
| b | 0.64 | 0.76 | 0.89 |
| c | 0.40 | 0.50 | 0.61 |
| c1 | 0.46 | 0.50 | 0.58 |
| D | 5.97 | 6.10 | 6.23 |
| D1 | 5.05 | -- | -- |
| E | 6.35 | 6.60 | 6.73 |
| E1 | 4.32 | -- | -- |
| b3 | 5.21 | 5.38 | 5.55 |
| e | 2.29 BSC | | |
| H | 9.40 | 10.00 | 10.40 |
| L | 0.89 | -- | 1.27 |
| L2 | 1.40 | -- | 1.78 |
| V1 | 7° REF | | |
| V2 | 0° | -- | 6° |

**Package Outline Type-B**



Top View

Side View

Detail A

Bottom View

Front View

Detail A
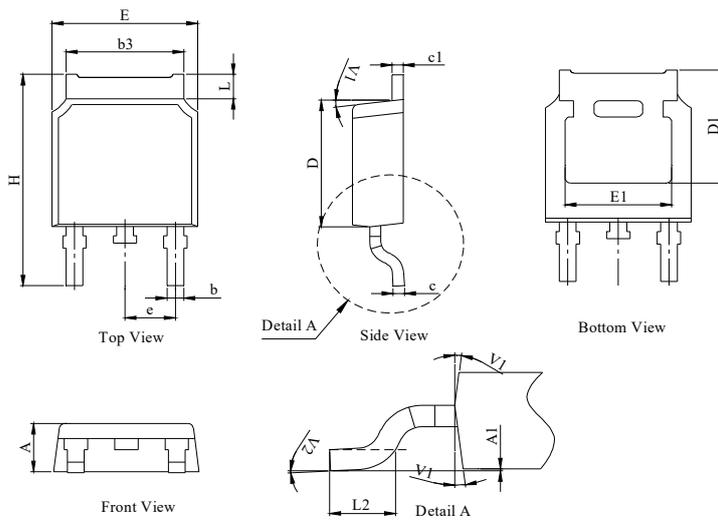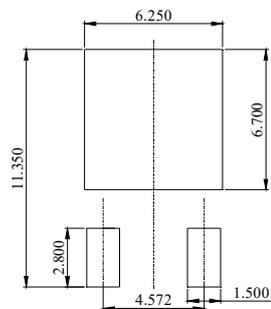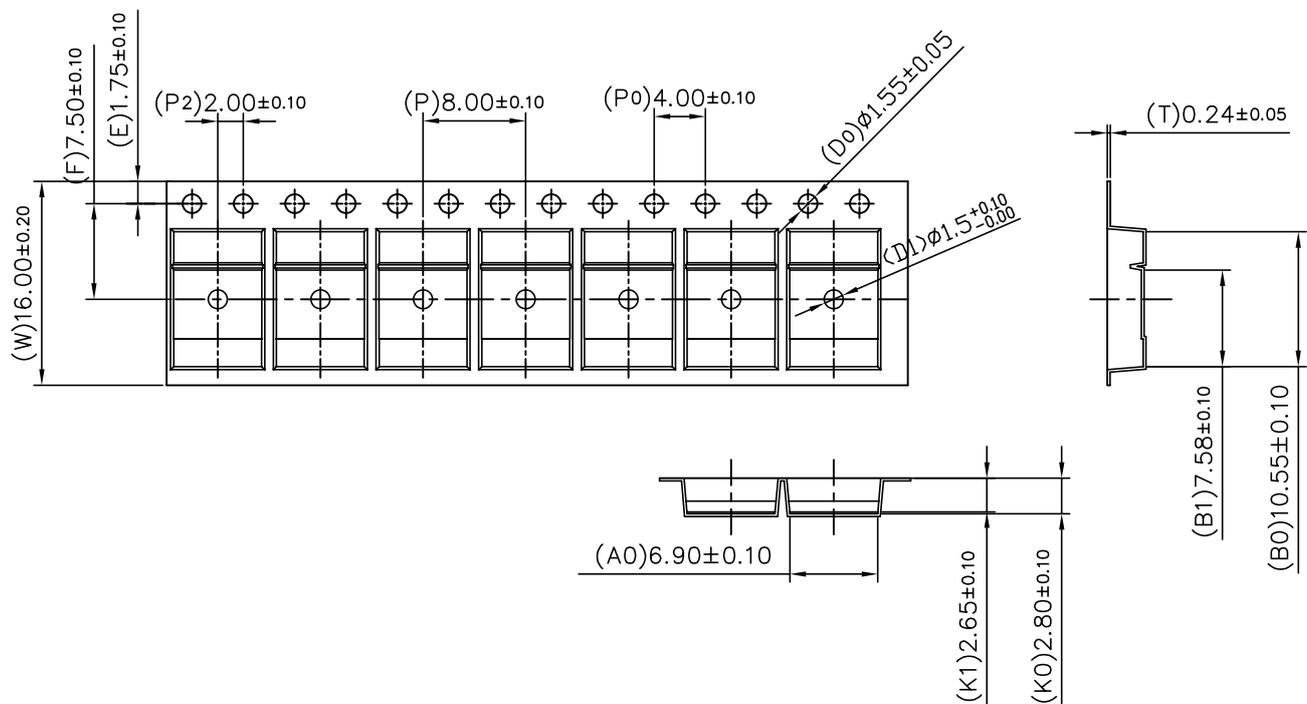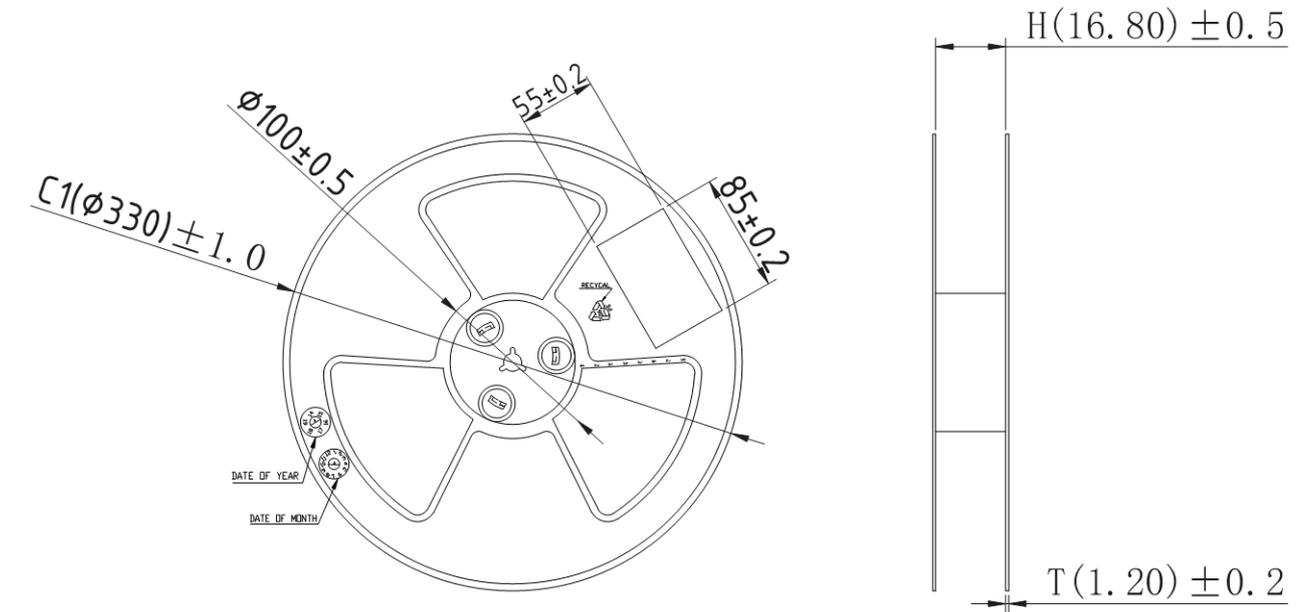
| DIM. | MILLIMETER | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 2.10 | 2.30 | 2.40 |
| A1 | 0 | -- | 0.13 |
| b | 0.66 | 0.76 | 0.86 |
| b3 | 5.21 | 5.38 | 5.55 |
| c | 0.40 | 0.50 | 0.60 |
| c1 | 0.44 | 0.50 | 0.58 |
| D | 5.90 | 6.10 | 6.30 |
| D1 | 5.30REF | | |
| E | 6.40 | 6.60 | 6.80 |
| E1 | 4.63 | - | - |
| e | 2.29 BSC | | |
| H | 9.50 | 10.00 | 10.70 |
| L | 1.09 | -- | 1.21 |
| L2 | 1.35 | -- | 1.65 |
| V1 | 7° REF | | |
| V2 | 0° | -- | 6° |

**Recommended Soldering Footprint**



6.250

6.700

11.350

2.800

4.572

1.500

## Tape & Reel Information

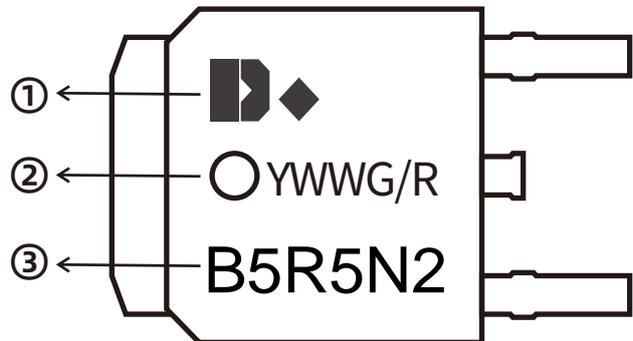Dimensions in mm



Pulling direction

## Marking Information：

①. Doingter LOGO

②. Date Code(YWWG / R)

   Y : Year Code , last digit of the year

   WW : Week Code(01-53)

   G/R : G(Green) /R(Lead Free)

③. Part NO.

① ← D◆

② ← ○ YWWG/R

③ ← B5R5N2

## Previous Version

| Version | Date | Subjects (major changes since last revision) |
|---------|------|----------------------------------------------|
| 1.1 | 2025-05-24 | Release of final version |

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