



# TN15N60TE

## N-Channel Enhancement Mode Power MOSFET

### Product Summary

- $V_{DS} = 60V, I_D = 15A$
- $R_{DS(on)} < 33m\Omega @ V_{GS} = 10V$
- $R_{DS(on)} < 45m\Omega @ V_{GS} = 4.5V$

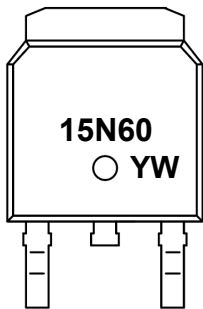
### Features

- Advanced Trench Technology
- 100% Avalanche Tested
- RoHS Compliant
- Halogen and Antimony Free
- Moisture Sensitivity Level 3

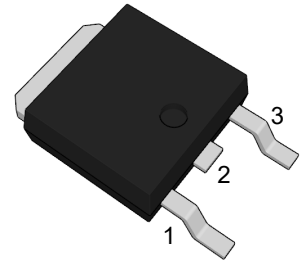
### Application

- Load Switch
- PWM Application
- Power Management

### Marking Code



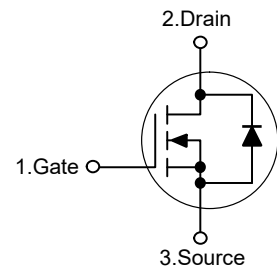
### TO-252



(Top View)

Pin	Description
1	Gate
2	Drain
3	Source

### Schematic Diagram



### Absolute Maximum Ratings

Ratings at 25°C case temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	15	A
Drain Current-Pulsed <sup>Note1</sup>	$I_{DM}$	60	A
Maximum Power Dissipation	$P_D$	25.5	W
Single Pulse Avalanche Energy <sup>Note2</sup>	$E_{AS}$	27.5	mJ
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C

### Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.9	°C/W
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### Electrical Characteristics

( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	--	--	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	$\pm 100$	nA
Gate Threshold Voltage <sup>Note3</sup>	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.6	2.5	V
Drain-Source On-Resistance <sup>Note3</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=15A$	--	27	33	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	--	33	45	m $\Omega$
Forward Transconductance <sup>Note3</sup>	$g_{FS}$	$V_{DS}=5V, I_D=2A$	--	7	--	S
Dynamic Characteristics						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	--	835	--	pF
Output Capacitance	$C_{oss}$		--	56	--	pF
Reverse Transfer Capacitance	$C_{rss}$		--	49	--	pF
Gate Resistance	$R_g$	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	--	1.52	--	$\Omega$
Total Gate Charge	$Q_g$	$V_{DS}=30V, I_D=15A,$ $V_{GS}=10V$	--	19	--	nC
Gate-Source Charge	$Q_{gs}$		--	4.2	--	nC
Gate-Drain Charge	$Q_{gd}$		--	3.6	--	nC
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=17A,$ $V_{GS}=10V, R_{GEN}=2.7\Omega$	--	10	--	nS
Turn-on Rise Time	$t_r$		--	70	--	nS
Turn-off Delay Time	$t_{d(off)}$		--	16	--	nS
Turn-off Fall Time	$t_f$		--	5	--	nS
Source-Drain Diode Characteristics						
Diode Forward Voltage <sup>Note3</sup>	$V_{SD}$	$V_{GS}=0V, I_S=15A$	--	--	1.2	V
Diode Forward Current	$I_S$		--	--	15	A

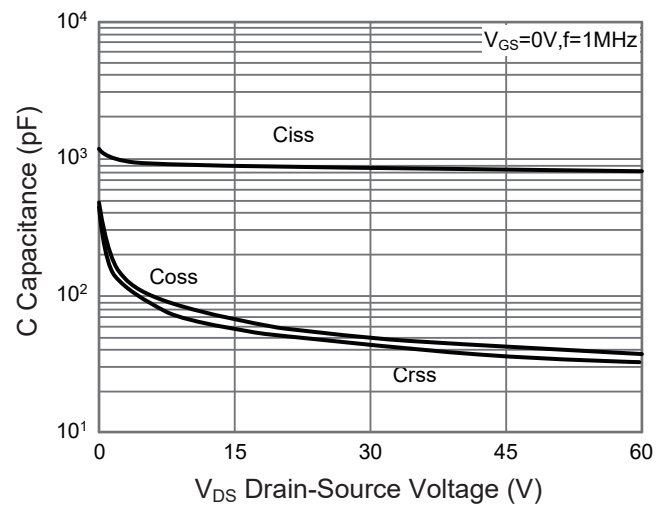
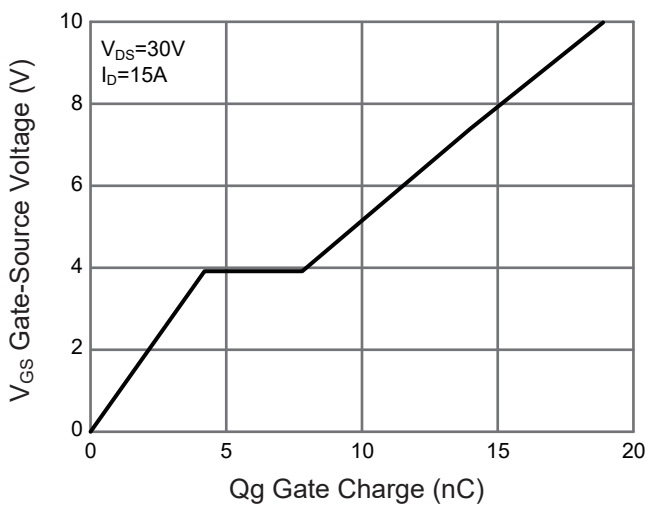
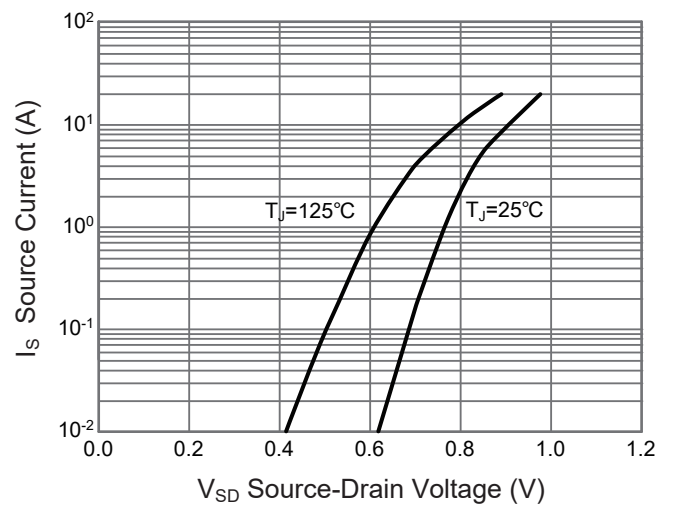
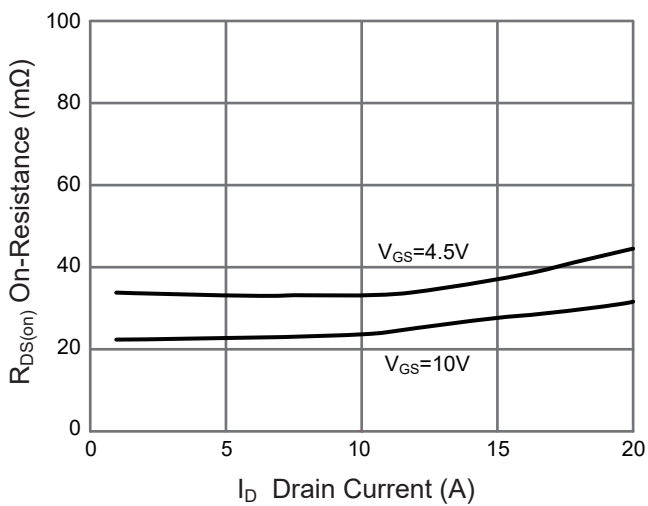
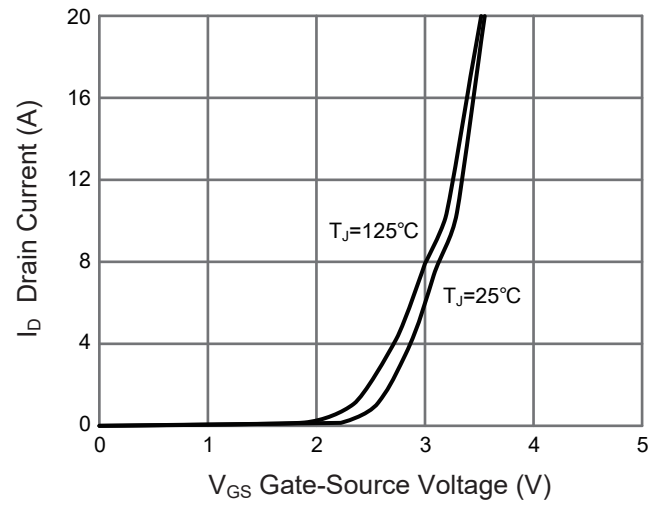
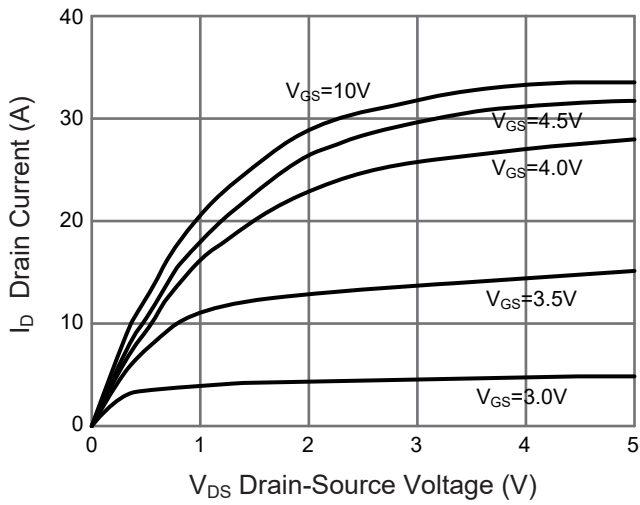
Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature  
2. EAS condition:  $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_G=10V, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=10.5A$   
3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$



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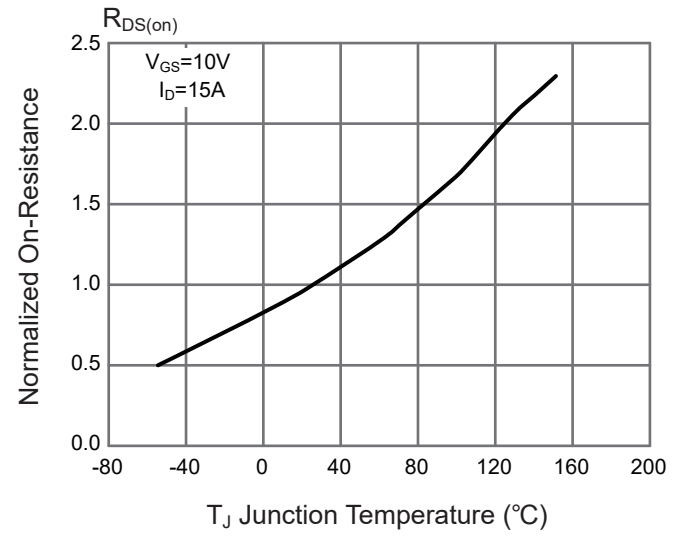
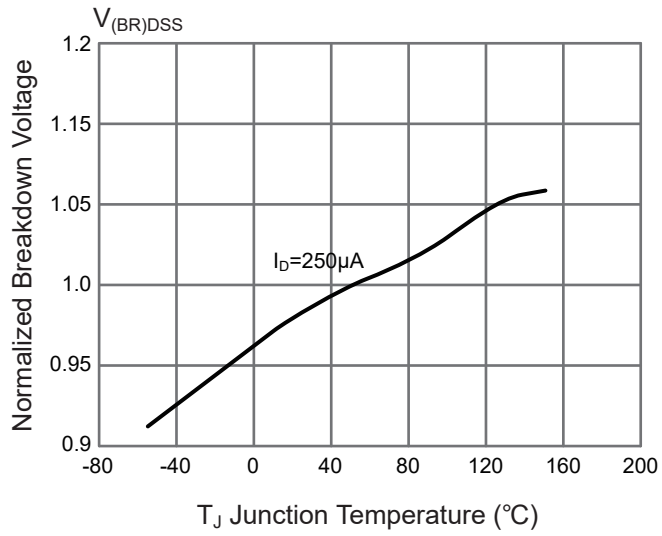
### Typical Characteristic Curves





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## N-Channel Enhancement Mode Power MOSFET





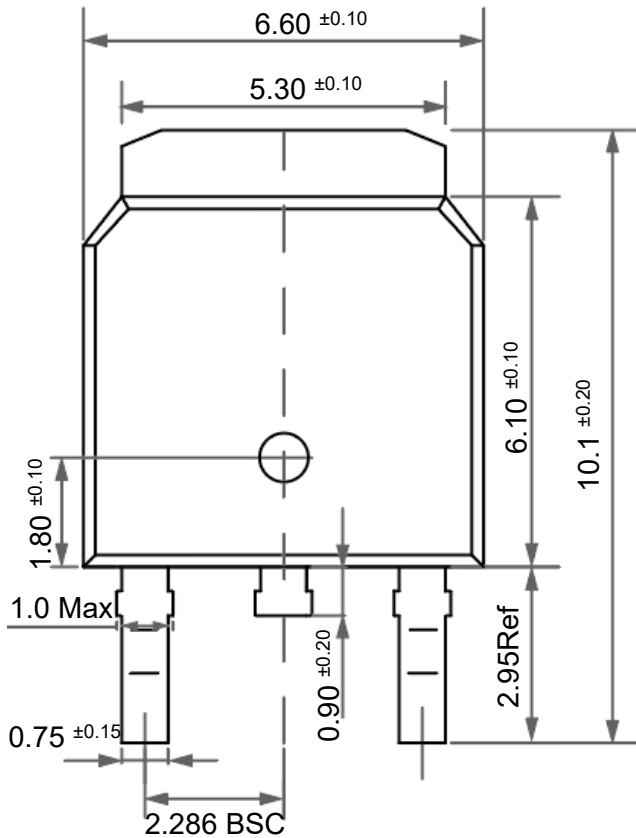
# TN15N60TE

## N-Channel Enhancement Mode Power MOSFET

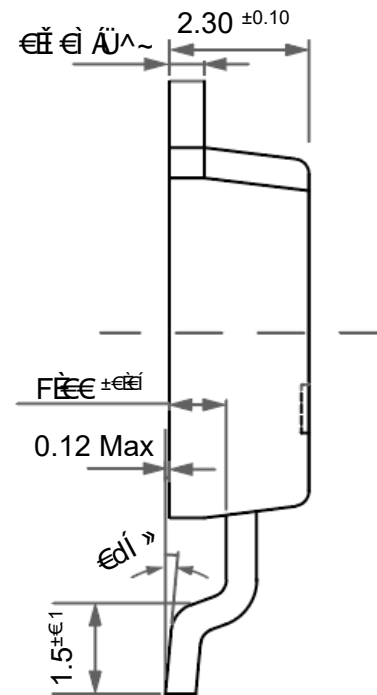
### Package Outline

TO-252

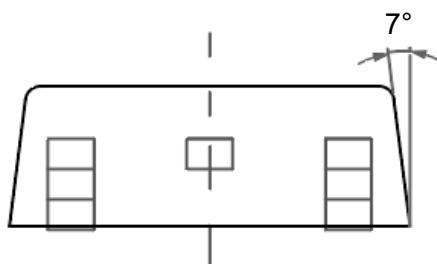
Dimensions in mm



Front View



Side View



Bottom View

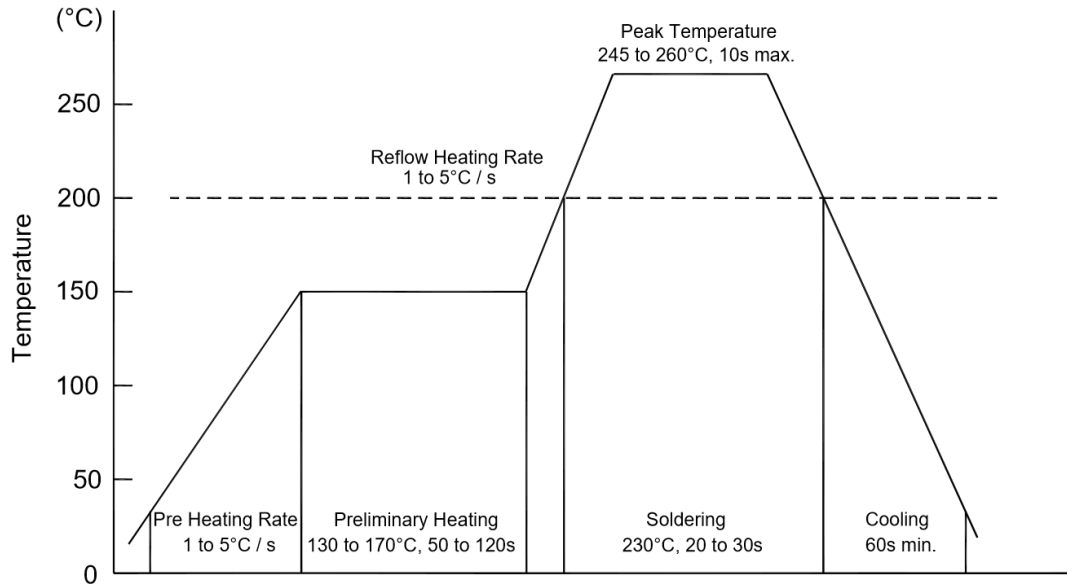
### Ordering Information

Device	Package	Shipping
TN15N60TE	TO-252	2,500PCS/Reel&13inches



### Conditions of Soldering and Storage

#### ◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245°C. If peak temperature is below 245°C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

#### ◆ Conditions of hand soldering

- Temperature: 300°C
- Time: 3s max.
- Times: one time

#### ◆ Storage conditions

- **Temperature**  
5 to 40°C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

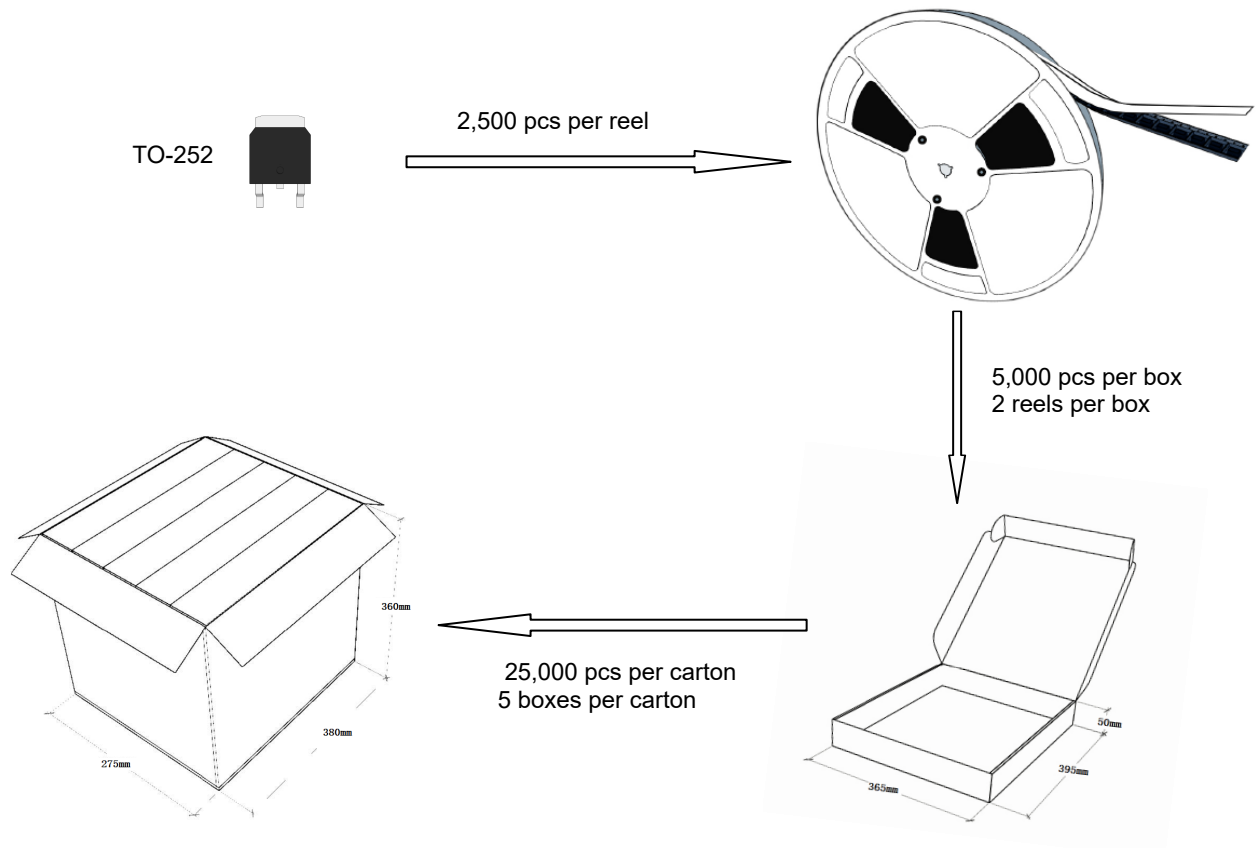


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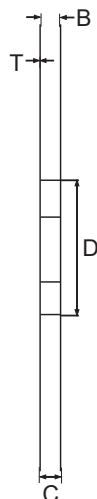
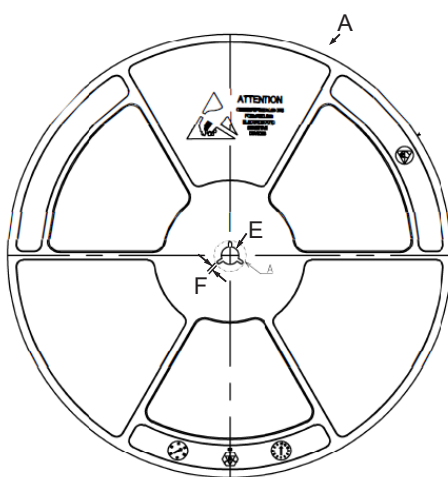
## N-Channel Enhancement Mode Power MOSFET

### Package Specifications

- The method of packaging



### ◆ reel data



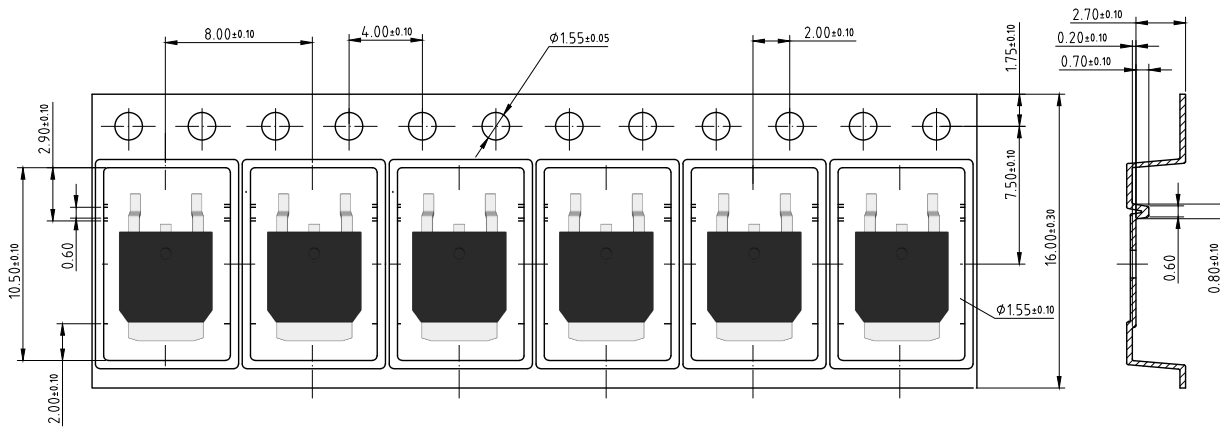
Symbol	Value(unit:mm)
A	$\Phi 330.2 \pm 1$
B	$17 \pm 0.5$
C	$21.2 \pm 2$
D	$\Phi 100 \pm 0.5$
E	$\Phi 13.4 \pm 0.2$
F	$2.3 \pm 0.2$
T	$2.1 \pm 0.2$



# TN15N60TE

## N-Channel Enhancement Mode Power MOSFET

### ◆ Embossed tape data








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### Contact Information

TANI website: <http://www.tanisemi.com> Email: [tani@tanisemi.com](mailto:tani@tanisemi.com)

For additional information, please contact your local Sales Representative.

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The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. TANI shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and TANI assumes no responsibility for the application of the product. TANI strives to provide accurate and up-to-date information to the best of our ability. However, due to technical, human, or other reasons, TANI cannot guarantee that the information provided in the product specification is entirely accurate and error-free. TANI shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications.

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