

TN180N20TE

N-Channel Enhancement Mode Power MOSFET

TO-252

Product Summary

- $V_{DS} = 20V, I_D = 180A$
- $R_{DS(on)} < 2.8m\Omega @ V_{GS} = 4.5V$
- $R_{DS(on)} < 4.0m\Omega @ V_{GS} = 2.5V$

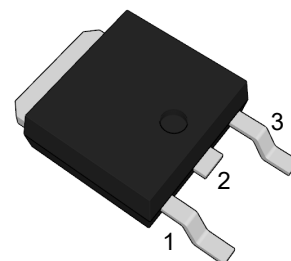
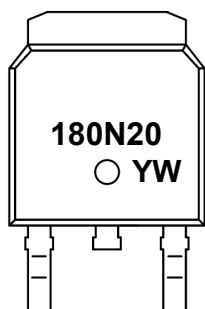
Features

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

Application

- DC-DC Converters
- Power Management Functions
- Backlighting

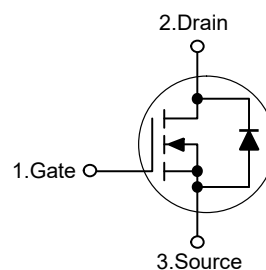
Marking Code



(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}	20	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	180	A
Drain Current-Pulsed ^{Note1}	I_{DM}	560	A
Maximum Power Dissipation	P_D	75	W
Single Pulse Avalanche Energy ^{Note2}	E_{AS}	380	mJ
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.8	°C/W
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Electrical Characteristics

(T_J=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	20	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	---	---	V/ °C
R _{DS(on)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =21A	---	---	---	mΩ
		V _{GS} =4.5V, I _D =20A	---	1.9	2.8	
		V _{GS} =2.5V, I _D =16A	---	---	---	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	0.4	---	1	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	---	---	mV/ °C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =20V, V _{GS} =0V, T _J =125°C	---	---	100	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =21A	---	---	---	S
Q _g	Total Gate Charge	V _{DS} =10V, V _{GS} =4.5V, I _D =21A	---	84	---	nC
Q _{gs}	Gate-Source Charge		---	12	---	
Q _{gd}	Gate-Drain Charge		---	16	---	
T _{d(on)}	Turn-On Delay Time	V _{DS} =10V, V _{GS} =4.5V, R _G =3Ω, R _L =0.5Ω	---	9.6	---	ns
T _r	Rise Time		---	24	---	
T _{d(off)}	Turn-Off Delay Time		---	90	---	
T _f	Fall Time		---	98	---	
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	---	6804	---	pF
C _{oss}	Output Capacitance		---	552	---	
C _{rss}	Reverse Transfer Capacitance		---	499	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	180	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =21A, T _J =25°C	---	---	1	V
t _{rr}	Reverse Recovery Time	I _F =21A, di/dt=100A/μs,	---	18	---	nS
Q _{rr}	Reverse Recovery Charge	T _J =25°C	---	7.2	---	nC

Note :

- 1..Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.EAS condition: T_J=25°C, V_{DD}=10V, V_G=10V, R_G=25Ω, L=0.5mH.
- 3.Repetitive Rating: Pulse width limited by maximum junction temperature.e.

Typical Characteristic Curves

Figure 1. Output Characteristics

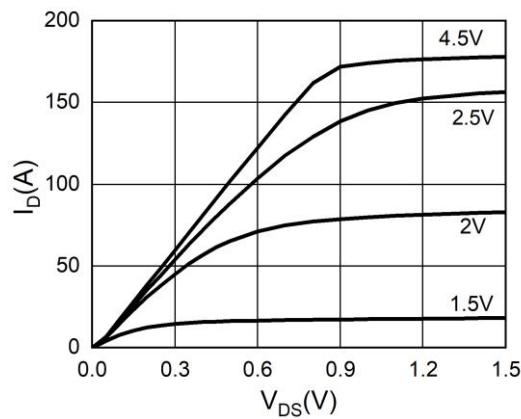


Figure 2. Transfer Characteristics

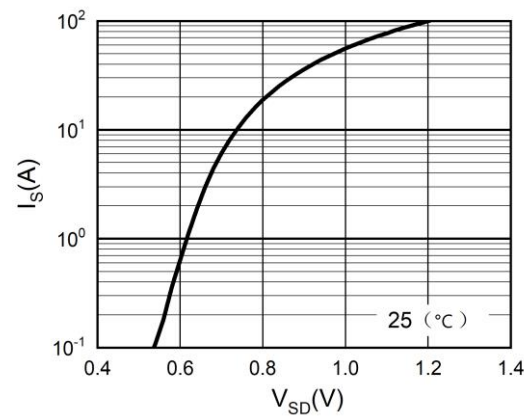


Figure 3. Power Dissipation

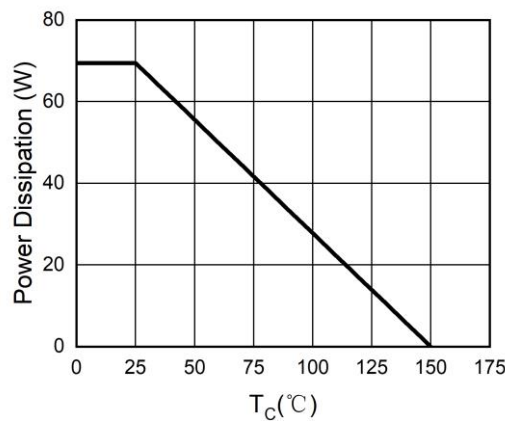


Figure 4. Drain Current

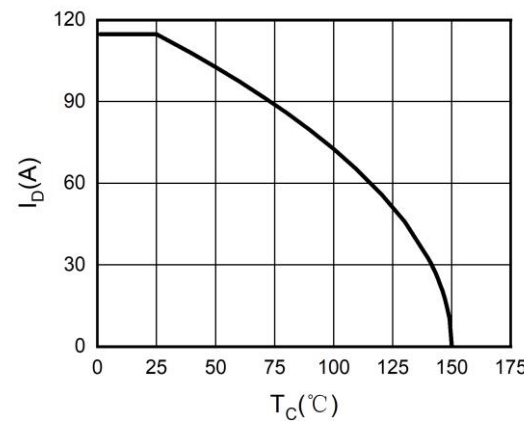


Figure 5. BV_{DSS} vs Junction Temperature

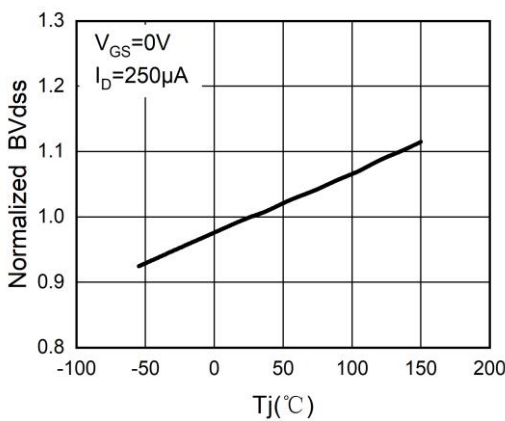


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

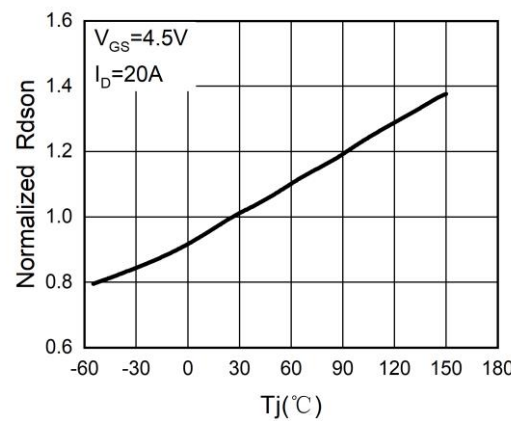


Figure 7. Gate Charge Waveforms

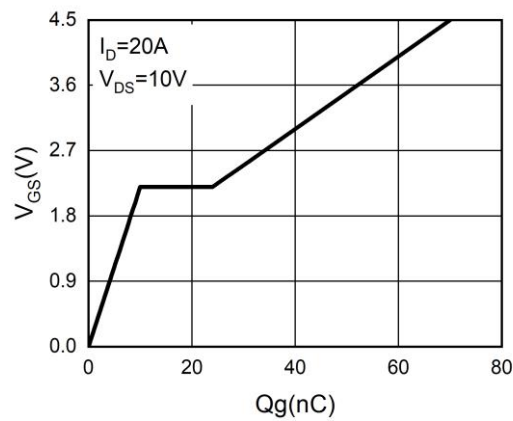


Figure 8. Capacitance

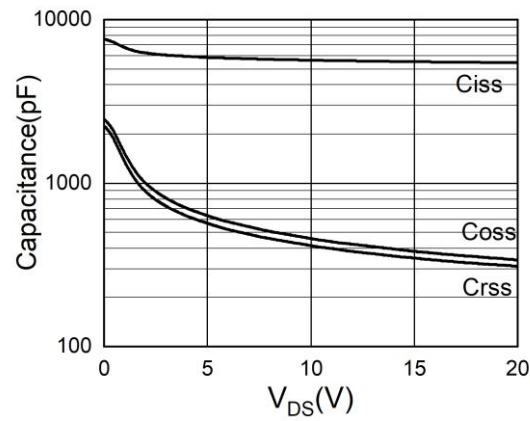


Figure 9. Body-Diode Characteristics

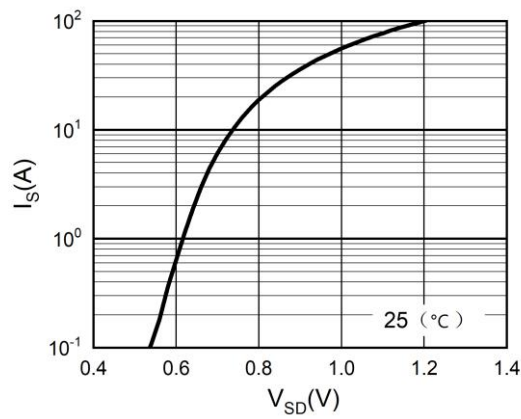
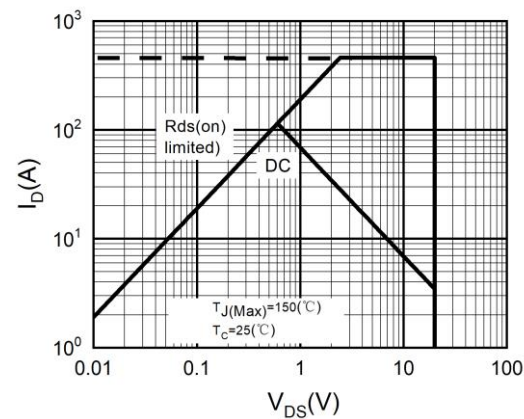


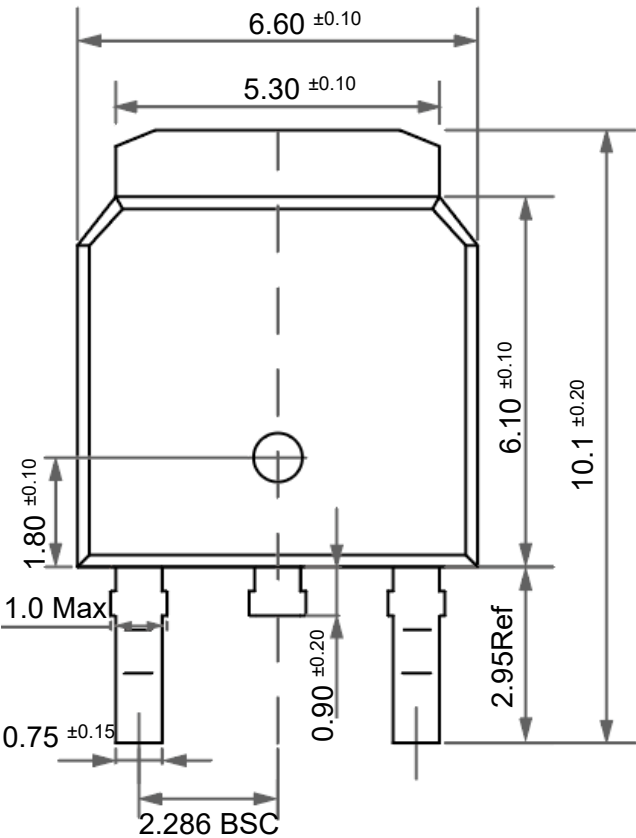
Figure 10. Maximum Safe Operating Area



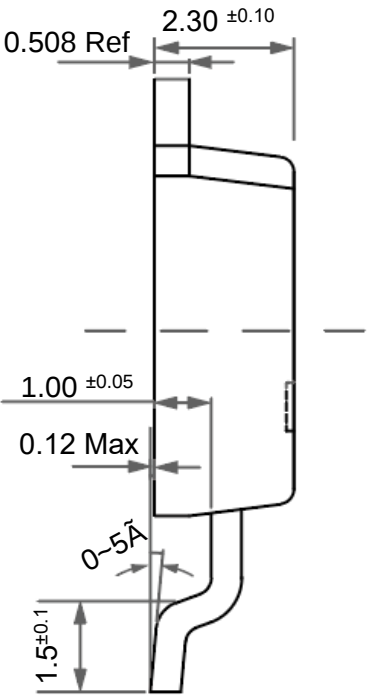
Package Outline

TO-252

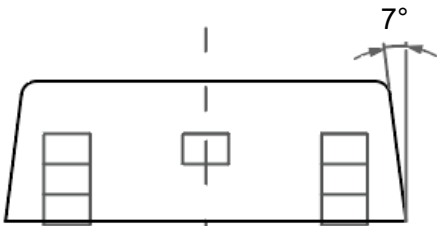
Dimensions in mm



Front View



Side View



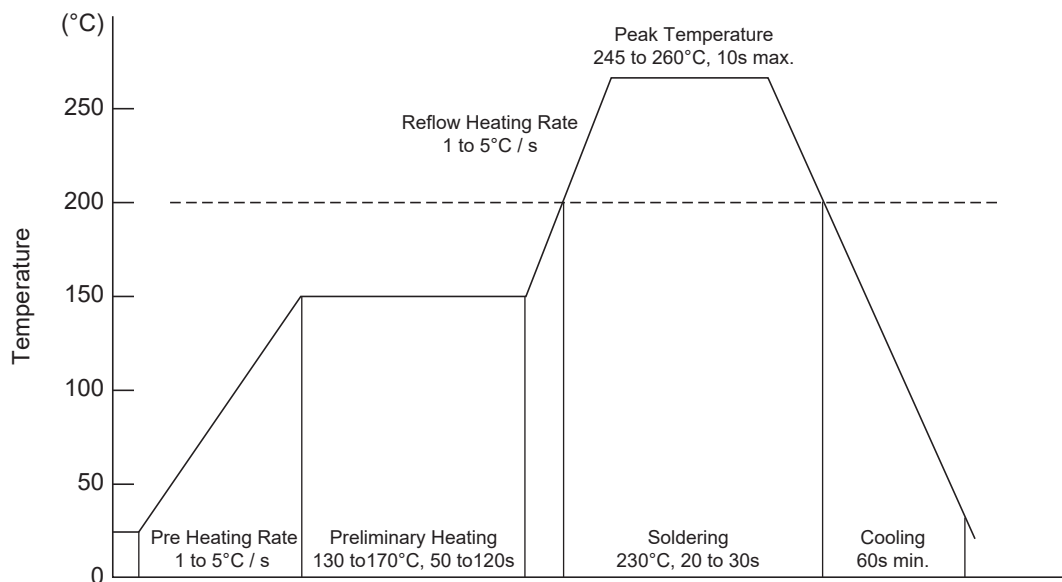
Bottom View

Ordering Information

Device	Package	Shipping
TN80N20TE	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

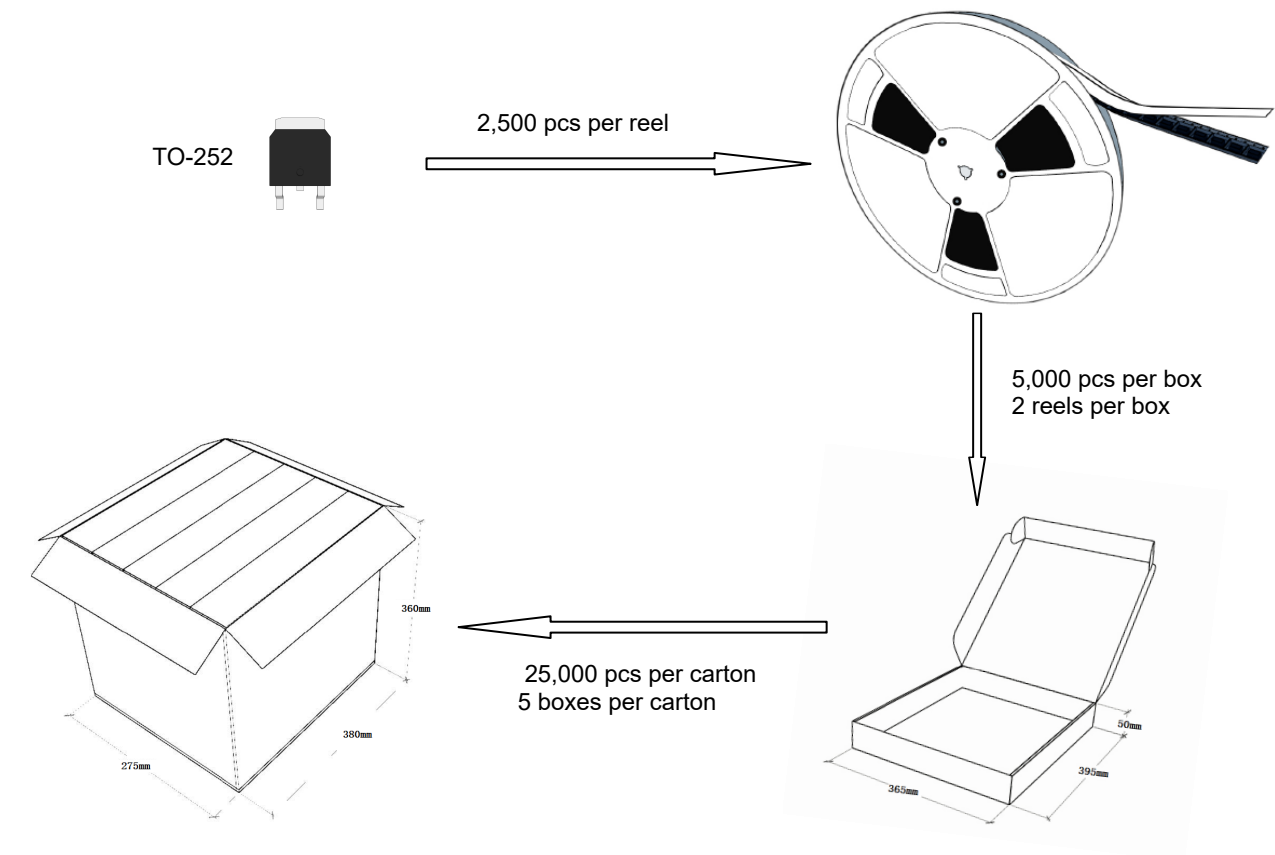
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

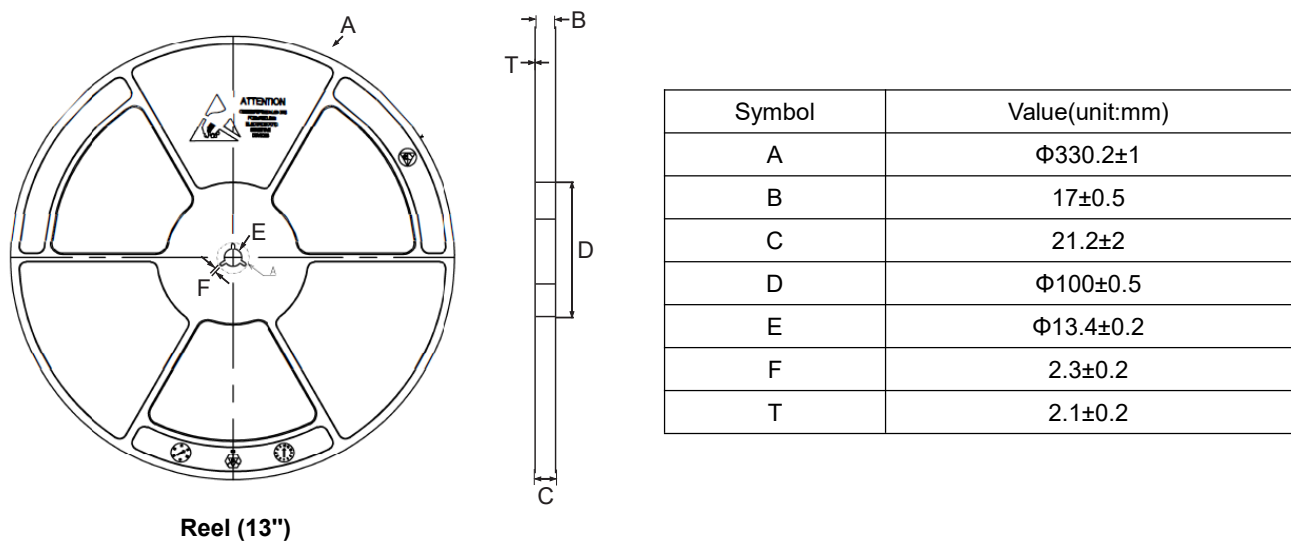
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

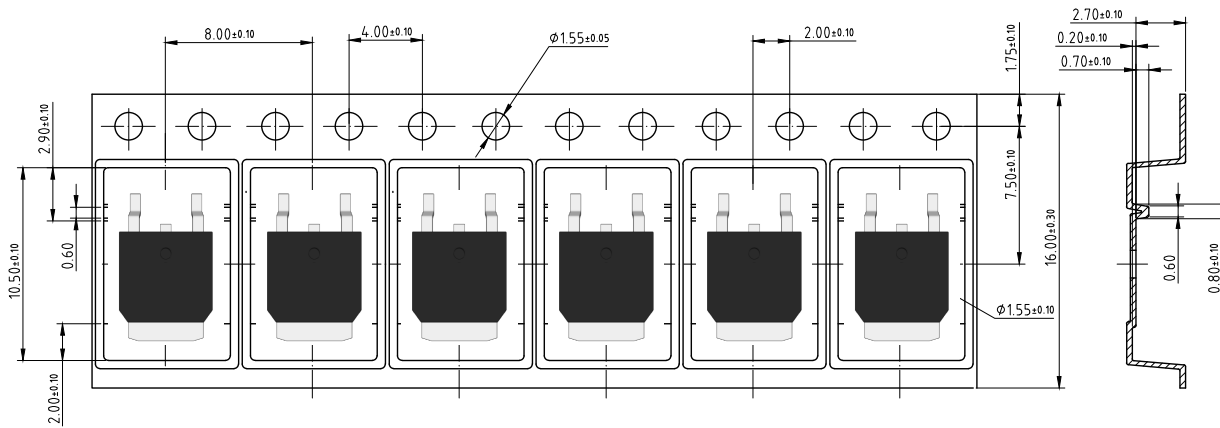
- The method of packaging



◆ reel data



◆ Embossed tape data



Contact Information

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For additional information, please contact your local Sales Representative.

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