TN30N20PA

N-Channel Enhancement Mode Power MOSFET

Product Summary

- V_{DS}= 20V,I_D= 30A
- $R_{DS(on)}$< 4mΩ @V_{GS}= 4.5V
- $R_{DS(on)}$< 6mΩ @V_{GS}= 2.5V

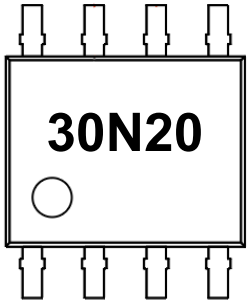
Features

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

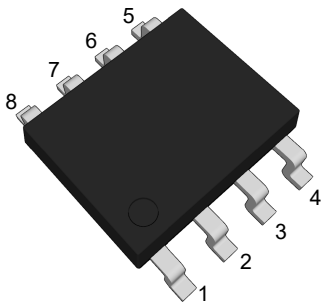
Application

- Load Switch
- Battery Protection
- Uninterruptible Power Supply

Marking Code



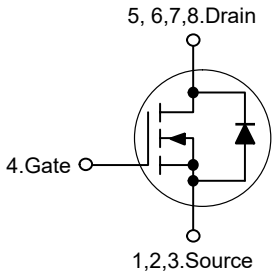
SOP-8



(Top View)

Pin	Description
1,2,3	Source
4	Gate
5,6,7,8	Drain

Schematic Diagram



Absolute Maximum Ratings

Ratings at 25℃ ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	30	A
Drain Current-Pulsed Note1	I_{DM}	70	A
Maximum Power Dissipation	P_D	3.3	W
Single Pulsed Avalanche Energy Note2	E_{AS}	45	mJ
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance,Junction-to-Ambient Note3	$R_{\theta JA}$	42	°C/W

Electrical Characteristics

(T_J=25°C unless otherwise specified)

PARAMETER	SYMB L	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	20	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA	-	20	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	-6.7	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250 µA	1.2	-	2.4	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 55 °C	-	-	10	
On-state drain current [a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	30	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 15 A	-	0.0021	0.0041	Ω
		V_{GS} = 4.5 V, I_D = 10 A	-	0.0026	0.0062	
Forward transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 15 A	-	63	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	-	3630	-	pF
Output capacitance	C_{oss}		-	1085	-	
Reverse transfer capacitance	C_{rss}		-	453	-	
Total gate charge	Q_g	V_{DS} = 10 V, V_{GS} = 10 V, I_D = 10 A	-	60	90	nC
		V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 10 A	-	28.7	44	
Gate-source charge	Q_{gs}		-	.9	-	
Gate-drain charge	Q_{gd}		-	7.4	-	
Gate resistance	R_g	f = 1 MHz	0.3	1.2	2.4	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 1 Ω, $I_D \cong$ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω	-	29	55	ns
Rise time	t_r		-	6	30	
Turn-off delay time	$t_{d(off)}$		-	0	75	
Fall time	t_f		-	13	26	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 1 Ω, $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	12	24	
Rise time	t_r		-		18	
Turn-off delay time	$t_{d(off)}$		-	2	60	
Fall time	t_f		-	9	18	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	5.4	A
Pulse diode forward current [a]	I_{SM}		-	-	70	
Body diode voltage	V_{SD}	I_S = 4 A	-	0.74	1.1	V
Body diode reverse recovery time	t_{rr}	I_F = 10 A, di/dt = 100 A/µs, T_J = 25 °C	-	30	60	ns
Body diode reverse recovery charge	Q_{rr}		-	20	40	nC
Reverse recovery fall time	t_a		-	16	-	ns
Reverse recovery rise time	t_b		-	14	-	

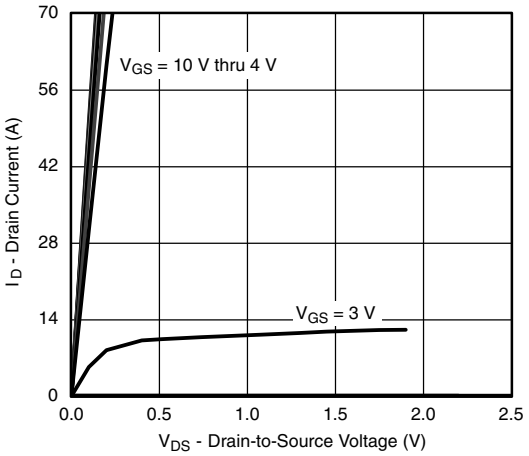
Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

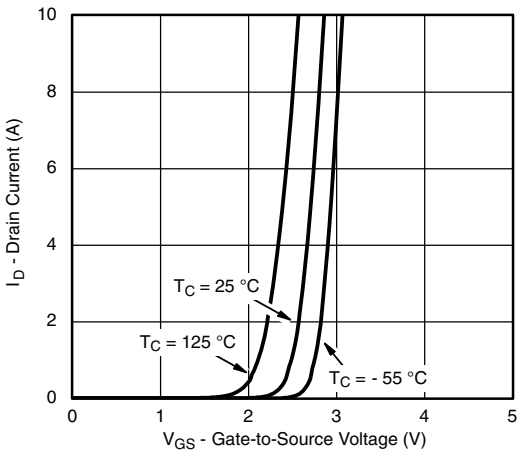
b. Guaranteed by design, not subject to production testing

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

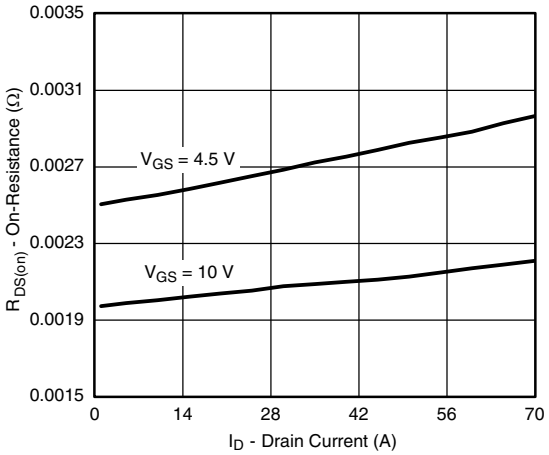
Typical Characteristic Curves



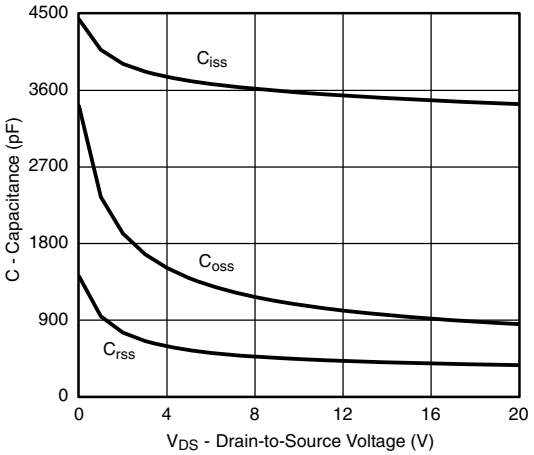
Output Characteristics



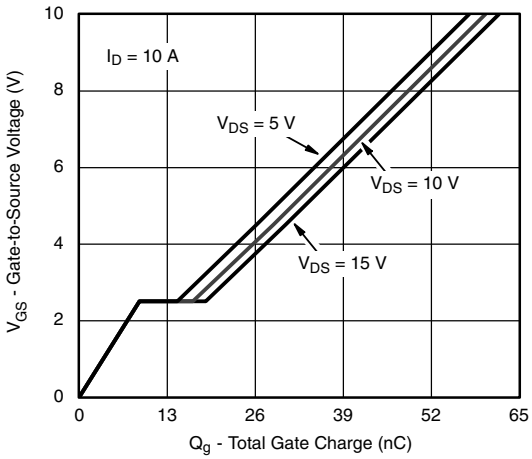
Transfer Characteristics



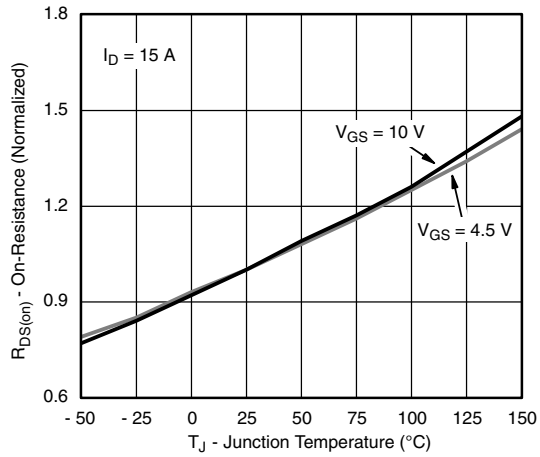
On-Resistance vs. Drain Current and Gate Voltage



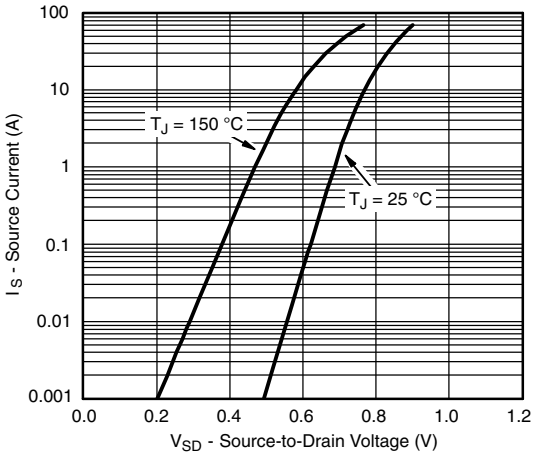
Capacitance



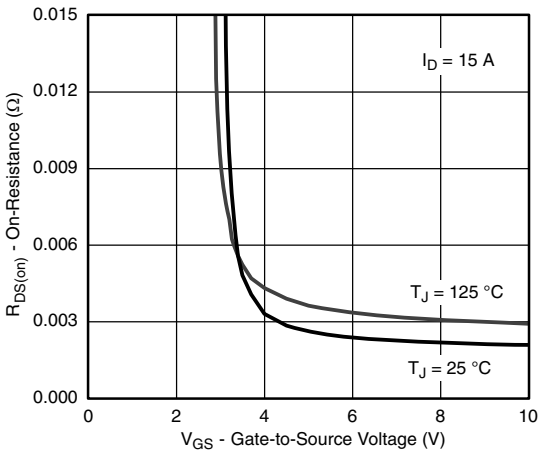
Gate Charge



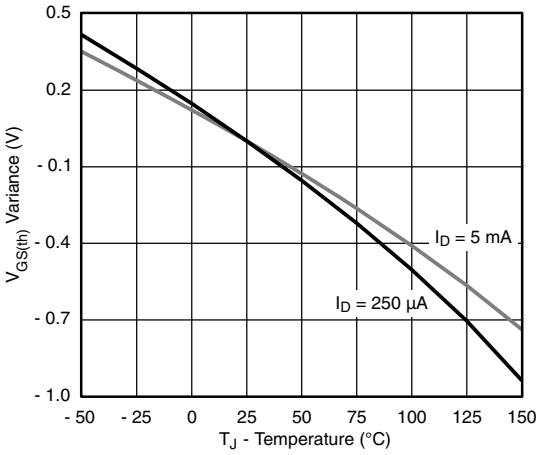
On-Resistance vs. Junction Temperature



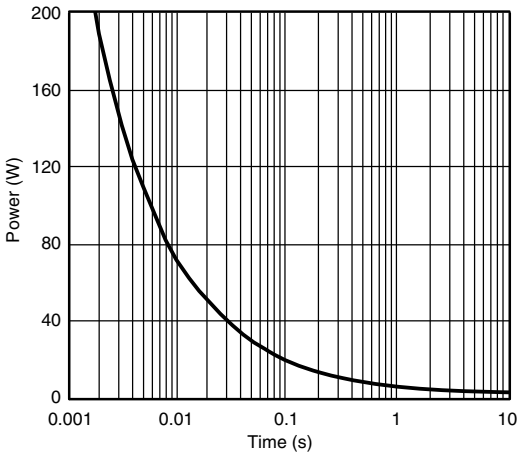
Source-Drain Diode Forward Voltage



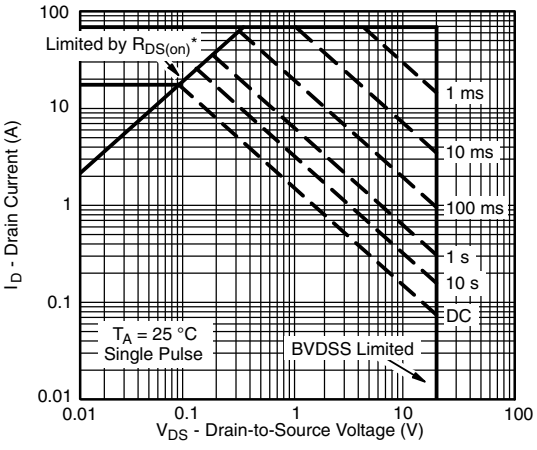
On-Resistance vs. Gate-to-Source Voltage



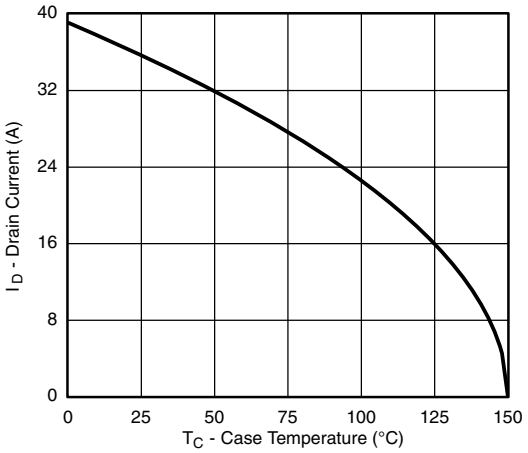
Threshold Voltage



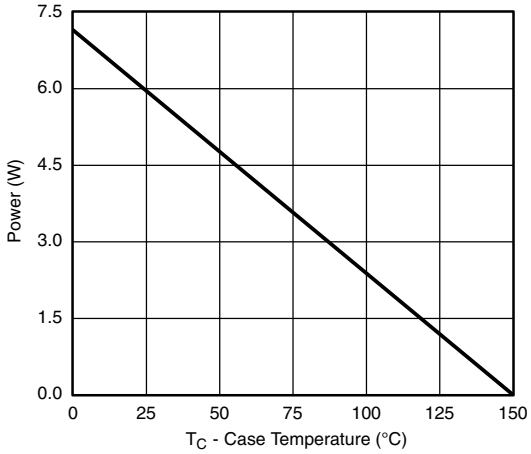
Single Pulse Power, Junction-to-Ambient



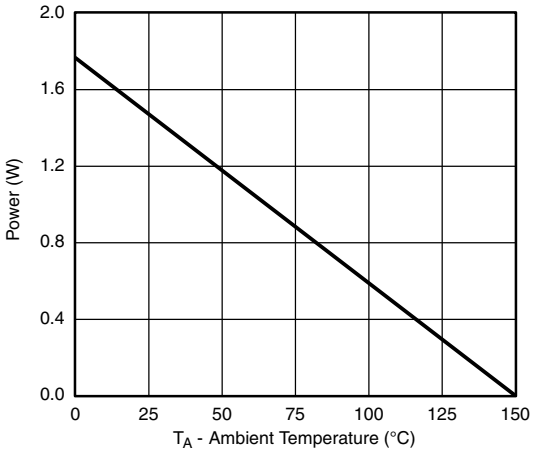
Safe Operating Area, Junction-to-Ambient



Current Derating [a]



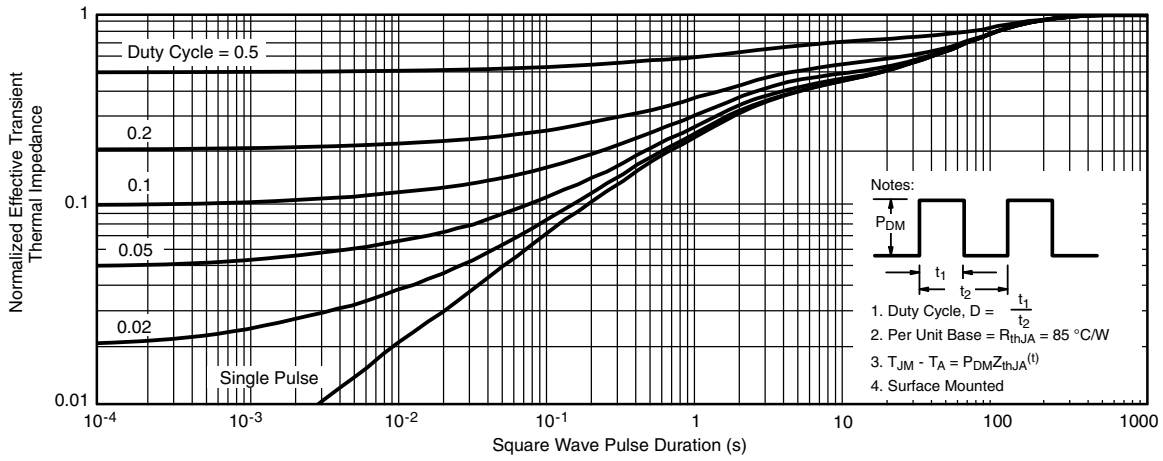
Power, Junction-to-Foot



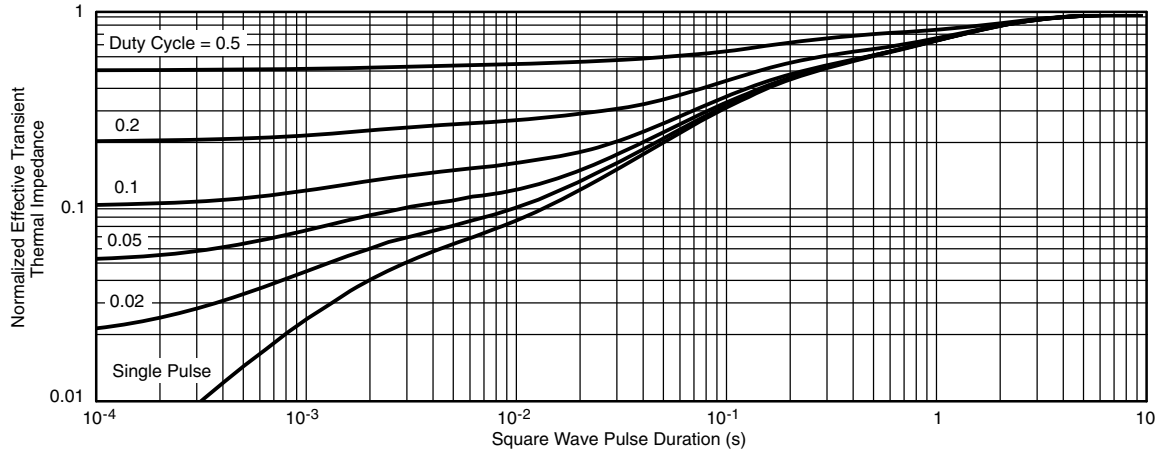
Power, Junction-to-Ambient

Note

a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



Normalized Thermal Transient Impedance, Junction-to-Ambient

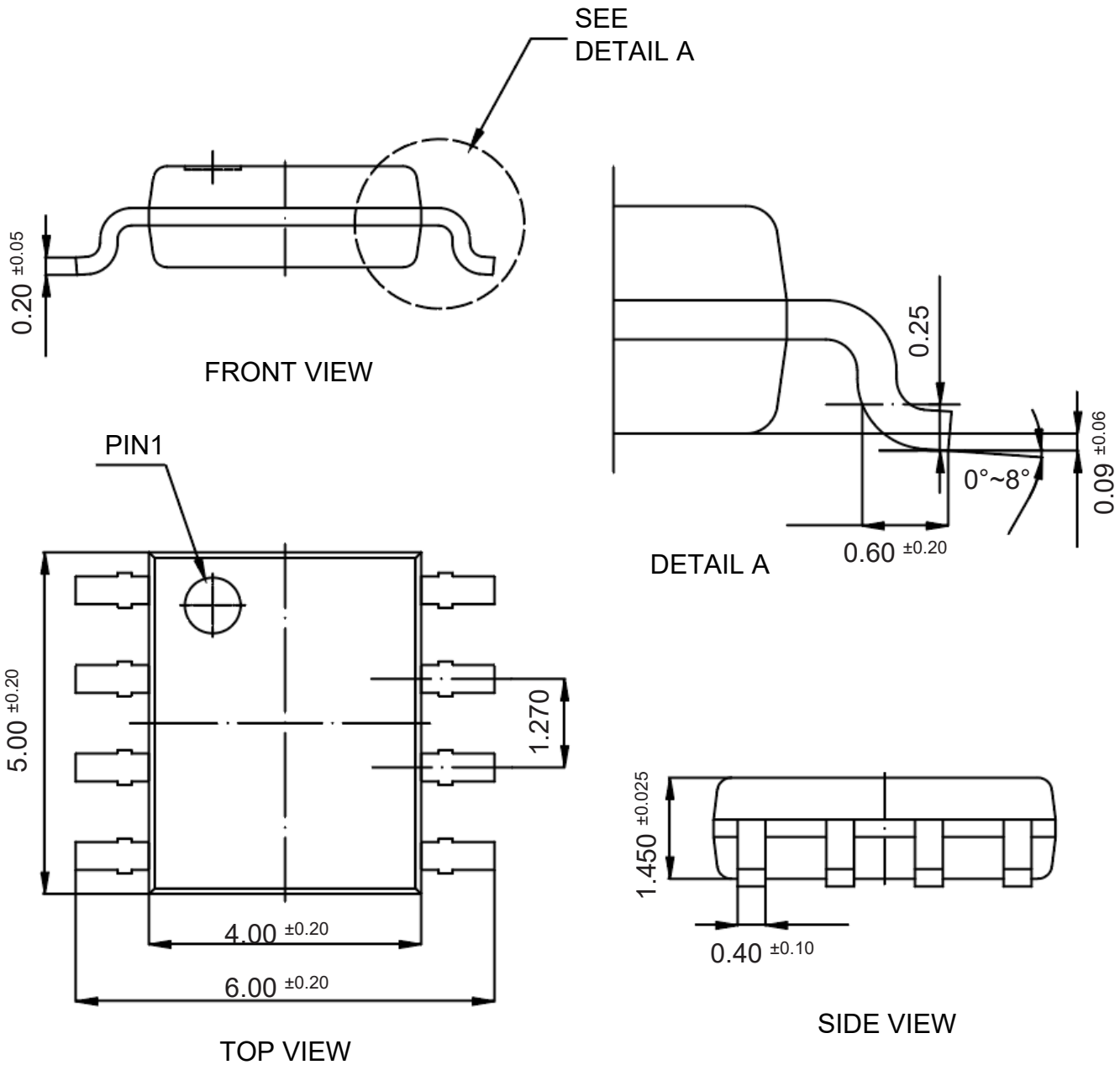


Normalized Thermal Transient Impedance, Junction-to-Foot

Package Outline

SOP-8

Dimensions in mm

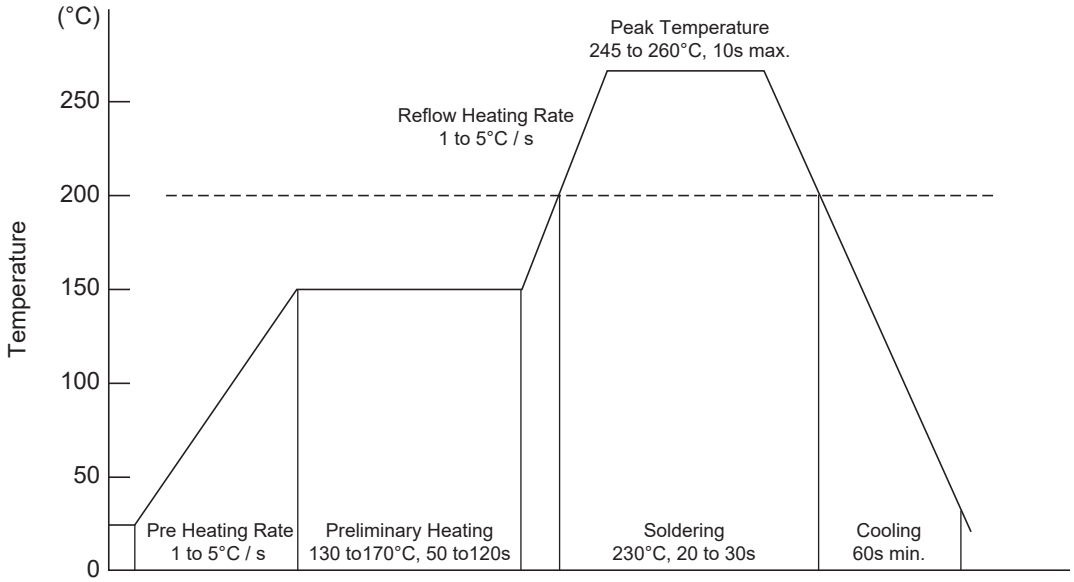


Ordering Information

Device	Package	Shipping
TN30N20PA	SOP-8	4,000PCS/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

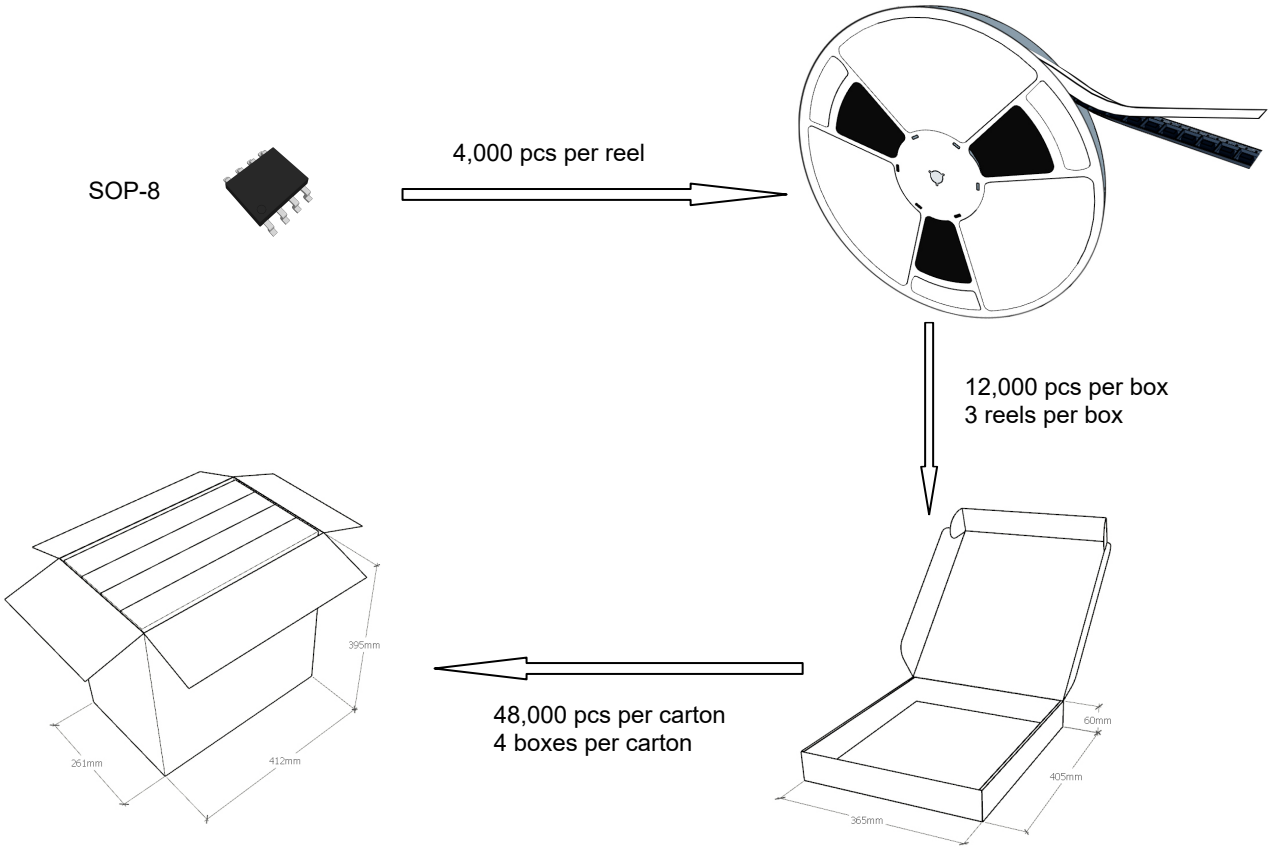
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

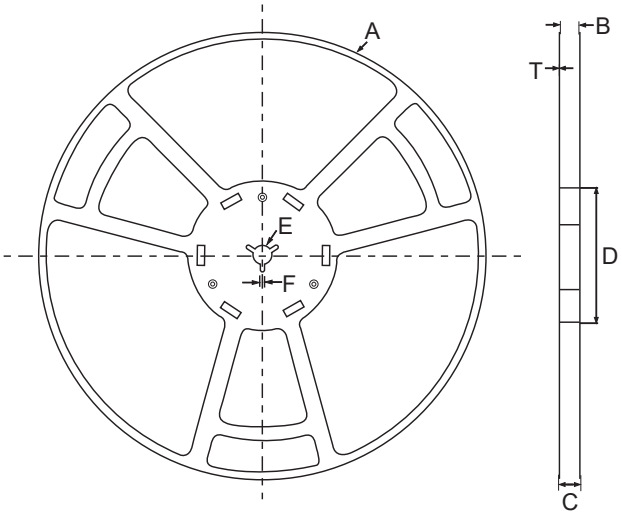
- **Temperature**
  5 to 40°C
- **Humidity**
  30 to 80% RH
- **Recommended period**
  One year after manufacturing

Package Specifications

- The method of packaging

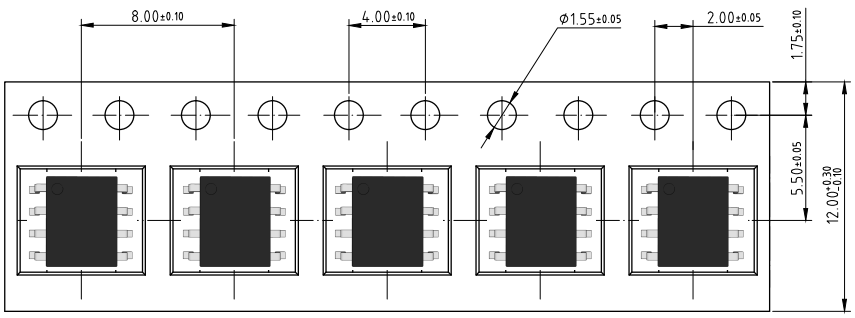


- **Embossed tape and reel data**



Reel (13")

symbol	Value(unit:mm)
A	ϕ330±1
B	12.7±0.5
C	16.5±0.3
D	ϕ99.5±0.5
E	ϕ13.6±0.3
F	2.8±0.3
T	1.9±0.2



Contact Information

TANI website: **http://www.tanisemi.com** Email:tani@tanisemi.com

For additional information, please contact your local Sales Representative.

Product Specification Statement

The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

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.

TANI reserves the right to revise or update the product specification and the products at any time without prior notice, and the user's continued use of the product specification is considered an acceptance of these revisions and updates. Prior to purchasing and using the product, users should verify the above information with TANI to ensure that the prod uct specification is the most current, effective, and complete. If users are particularly concerned about product parameters, please consult TANI in detail or request relevant product test reports. Any data not explicitly mentioned in the product specification shall be subject to separate agreement.

Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. TANI shall assume no responsibility for any consequences resulting from such usage.

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