

TN4606CJPA

N and P-Channel Complementary Power MOSFET

Product Summary

- **N-Channel**
- $V_{DS} = 20V, I_D = 5A$
- $R_{DS(on)} < 55m\Omega @ V_{GS} = 4.5V$
- $R_{DS(on)} < 85m\Omega @ V_{GS} = 2.5V$
- **P-Channel**
- $V_{DS} = -20V, I_D = -3.5A$
- $R_{DS(on)} < 104m\Omega @ V_{GS} = -4.5V$
- $R_{DS(on)} < 154m\Omega @ V_{GS} = -2.5V$

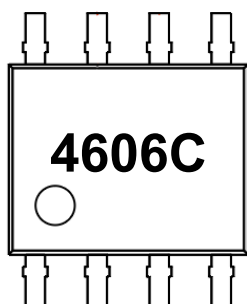
Features

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

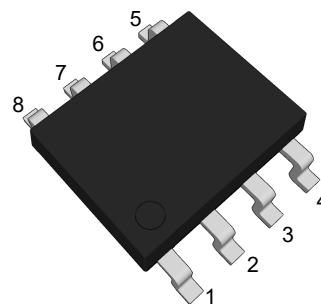
Application

- Power Management

Marking Code



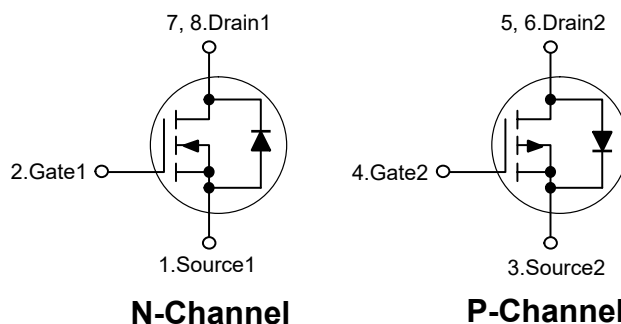
SOP-8



(Top View)

Pin	Description	Pin	Description
1	Source1	4	Gate2
2	Gate1	5,6	Drain2
3	Source2	7,8	Drain1

Schematic Diagram



Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	± 12		V
Drain Current-Continuous	I_D	5	-3.5	A
Drain Current-Pulsed ^{Note1}	I_{DM}	21	-17	A
Maximum Power Dissipation	P_D	2.00	2.00	W
Junction Temperature	T_J	150		°C
Storage Temperature Range	T_{STG}	-55 to +150		°C

Thermal Characteristics

Thermal Resistance,Junction-to-Ambient ^{Note2}	$R_{\theta JA}$	62.5	°C/W
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Electrical Characteristics

(T_a=25°C unless otherwise specified)

Parameter	Symbol		Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V _{(BR)DSS}	N-Ch	I _D =250μA, V _{GS} =0V	-20			V
		P-Ch	I _D =-250μA, V _{GS} =0V	20			V
Breakdown Voltage Temp. Coefficient	ΔV _{(BR)DSS} /T _J	N-Ch	I _D =1mA, Reference to 25°C		0.044		V/°C
		P-Ch	I _D =-1mA, Reference to 25°C		-0.012		V/°C
Static Drain-to-Source On-Resistance	R _{DS(ON)}	N-Ch	V _{GS} =4.5V, I _D =2.6A ③			55	mΩ
			V _{GS} =2.7V, I _D =2.2A ③			85	mΩ
		P-Ch	V _{GS} =-4.5V, I _D =-2.2A ③			104	mΩ
			V _{GS} =-2.7V, I _D =-1.8A ③			154	mΩ
Gate Threshold Voltage	V _{GS(th)}	N-Ch	V _{DS} =V _{GS} , I _D =250μA	0.7			V
		P-Ch	V _{DS} =V _{GS} , I _D =-250μA	-0.7			V
Forward Transconductance	g _{FS}	N-Ch	V _{DS} =15V, I _D =2.6A ③	8.3			S
		P-Ch	V _{DS} =-15V, I _D =-2.2A ③	4			S
Drain-to-Source Leakage Current	I _{DSS}	N-Ch	V _{DS} =16V, V _{GS} =0V			1	μA
		P-Ch	V _{DS} =-16V, V _{GS} =0V			-1	μA
		N-Ch	V _{DS} =16V, V _{GS} =0V, T _J =125°C			25	μA
		P-Ch	V _{DS} =-16V, V _{GS} =0V, T _J =125°C			-25	μA
Gate-to-Source Forward Leakage	I _{GSS}	N-P	V _{GS} =±12V			±100	
Total Gate Charge	Q _g	N-Ch	N-Channel			20	nC
		P-Ch	I _D =2.6A, V _{DS} =16V			22	nC
Gate-to-Source Charge	Q _{gs}	N-Ch	V _{GS} =4.5V			2.2	nC
		P-Ch	P-Channel			3.3	nC
Gate-to-Drain ("Miller") Charge	Q _{gd}	N-Ch	I _D =-2.2A			8	nC
		P-Ch	V _{DS} =-16V, V _{GS} =-4.5V			9	nC
Turn-On Delay Time	t _{D(on)}	N-Ch	N-Channel		9		ns
		P-Ch	V _{DD} =10V, I _D =2.6A		8.4		ns
Rise Time	t _r	N-Ch	R _G =6Ω, R _D =3.8Ω		42		ns
		P-Ch			26		ns

Turn-Off Delay Time	$t_{D(off)}$	N-Ch	P-Channel		32		ns
		P-Ch			51		ns
Fall Time	t_f	N-Ch	$V_{DD}=-10V, I_D=-2.2A$ $R_G=6\Omega, R_D=4.5\Omega$		51		ns
		P-Ch			33		ns
Internal Drain inductance	L_D	N-Ch	Between lead tipand center of die contact		4		nH
Internal Source inductance	L_S	P-Ch			6		nH
Input Capacitance	C_{iss}	N-Ch	N-Channel		660		pF
		P-Ch			610		pF
Output Capacitance	C_{oss}	N-Ch	$V_{GS}=0V, V_{DS}=15V, f=1.0MHz$		280		pF
		P-Ch			310		pF
Reverse Transfer Capacitance	C_{rss}	N-Ch	P-Channel $V_{GS}=0V, V_{DS}=-15V, f=1.0MHz$		140		pF
		P-Ch			170		
Source-Drain Ratings and Characteristics							
Continuous Source Current (Body Diode)	I_S	N-Ch				2.5	A
		P-Ch				-2.5	
Pulsed Source Current (Body Diode) ①	I_{SM}	N-Ch				21	
		P-Ch				-17	
Diode Forward Voltage	V_{SD}	N-Ch	$T_J=25^{\circ}C, I_S=1.8A, V_{GS}=0V$ ③			1	V
		P-Ch	$T_J=25^{\circ}C, I_S=-1.8A, V_{GS}=0V$ ③			-1	V
Reverse Recovery Time	t_{rr}	N-Ch	N-Channel: $T_J=25^{\circ}C$ $I_F=2.6A, dI/dt=100A/\mu s$		29	44	ns
		P-Ch			56	84	ns
Reverse Recovery Charge	Q_{rr}	N-Ch	P-Channel: $T_J=25^{\circ}C$ ③ $I_F=-2.2A, dI/dt=100A/\mu s$		22	33	nC
		P-Ch			71	110	nC
Forward Turn-On Time	t_{on}	N-Ch	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				
		P-Ch					

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 23)

② N-Channel $I_{SD} \leq 2.6A, di/dt \leq 100A/\mu s, V_{DD} \leq V_{BR(DSS)}, T_J \leq 150^\circ C$.

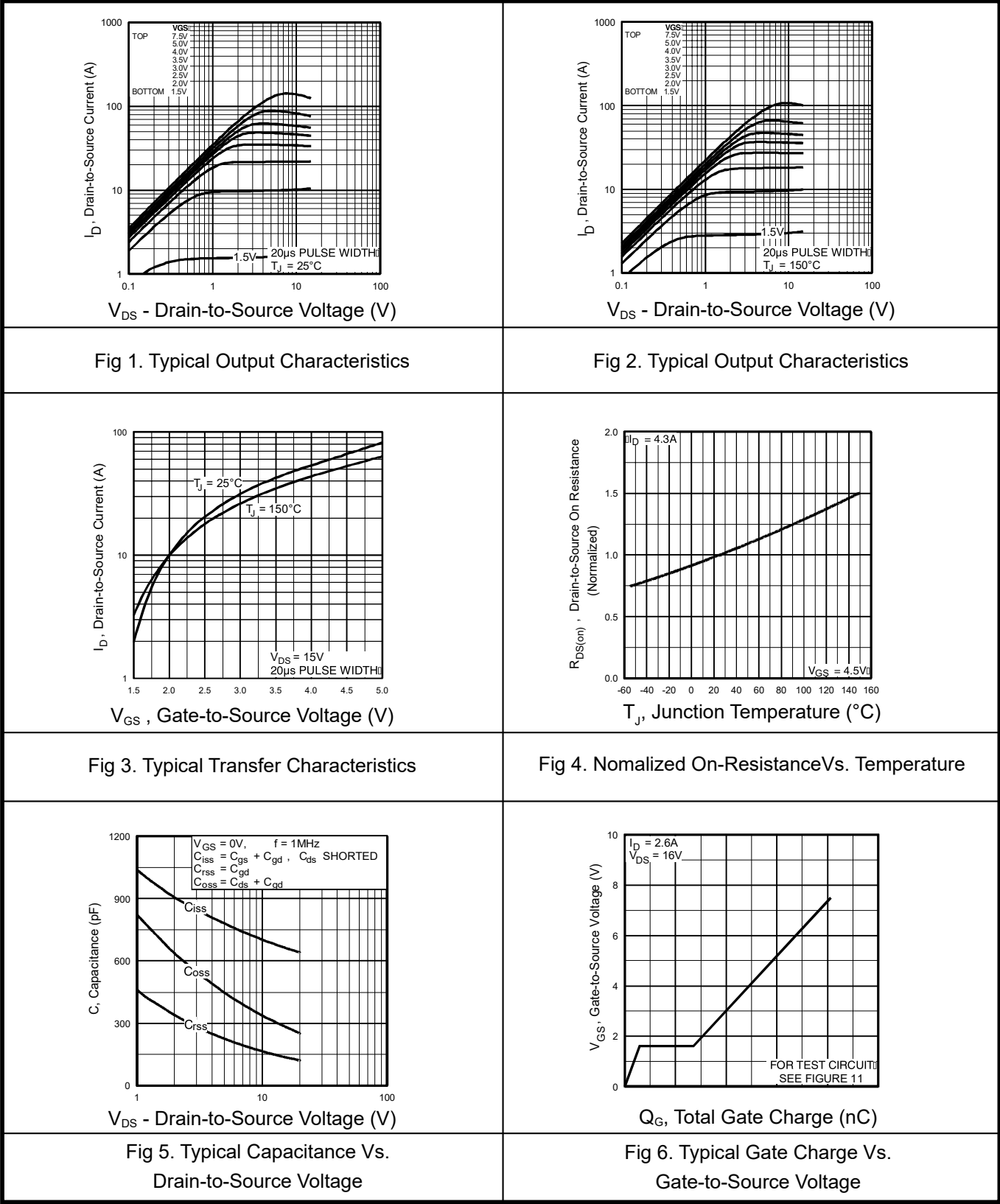
P-Channel $I_{SD} \leq -2.2A, di/dt \leq 50A/\mu s, V_{DD} \leq V_{BR(DSS)}, T_J \leq 150^\circ C$.

③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

④ Surface mounted on FR-4 board, $t \leq 10sec$.

N-Channel

Typical Characteristics Curves



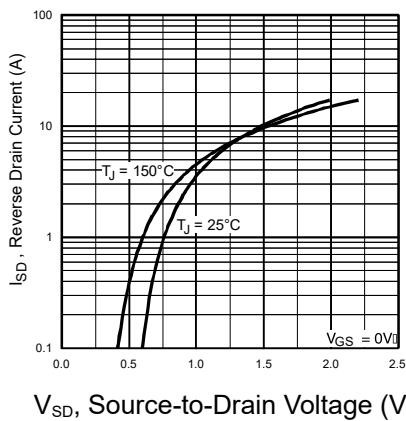


Fig 7. Typical Source-Drain Diode Forward Voltage

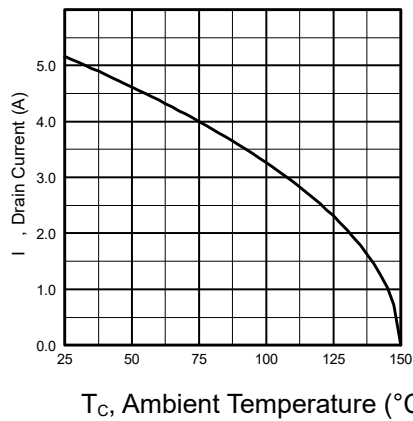


Fig 8. Maximum Drain Current Vs.AmbientTemperature

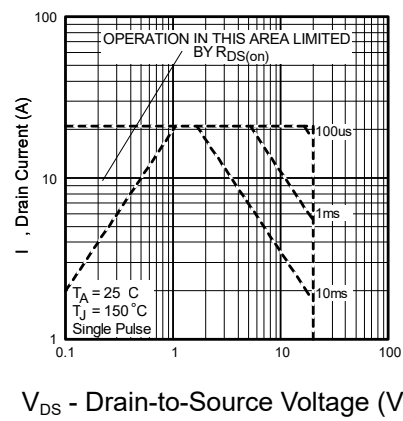


Fig 9. Maximum Safe Operating Area

P-Channel

Typical Characteristics Curves

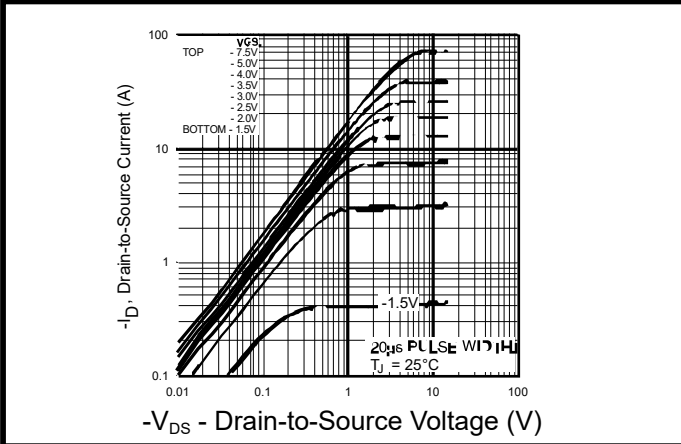


Fig 12. Typical Output Characteristics

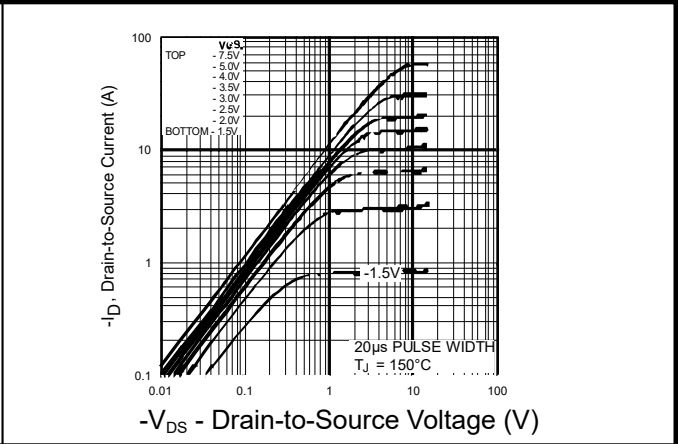


Fig 13. Typical Output Characteristics

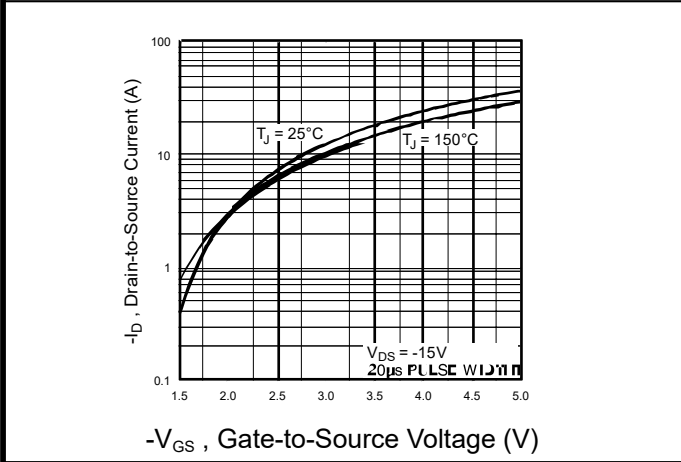


Fig 14. Typical Transfer Characteristics

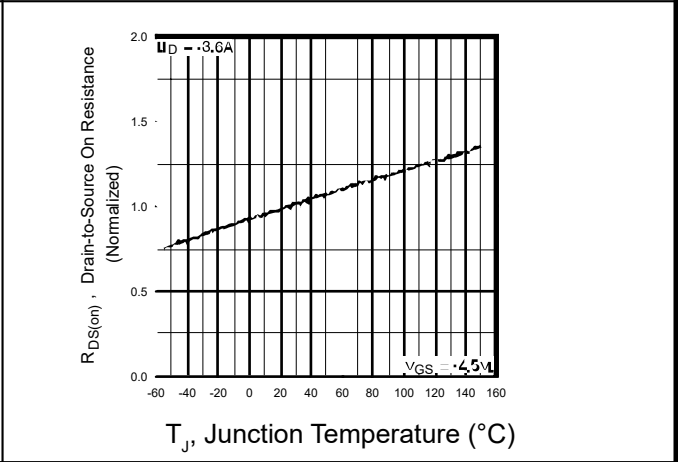


Fig 15. Normalized On-Resistance Vs. Temperature

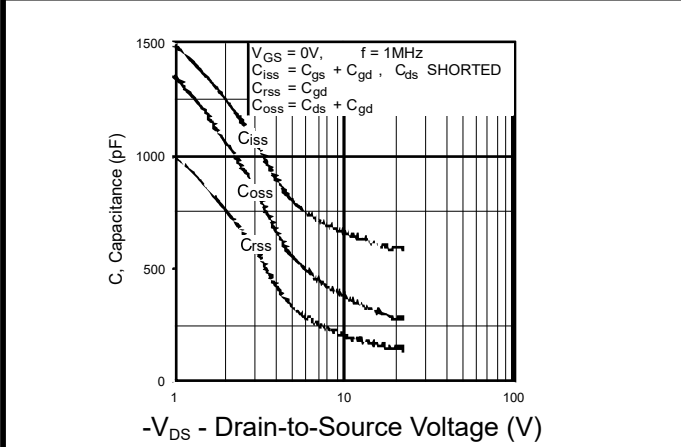


Fig 16. Typical Capacitance Vs. Drain-to-Source Voltage

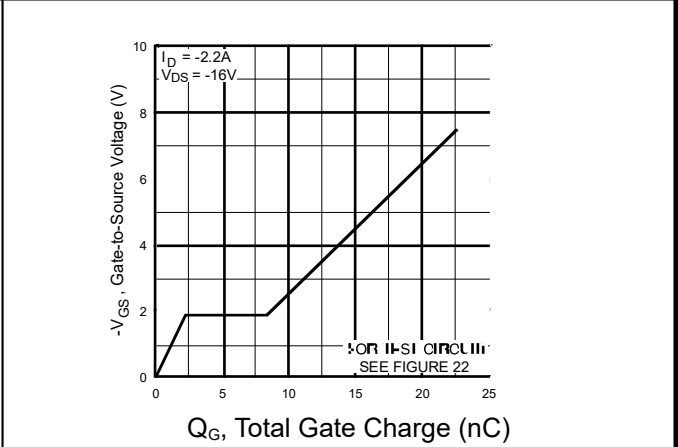


Fig 17. Typical Gate Charge Vs. Gate-to-Source Voltage

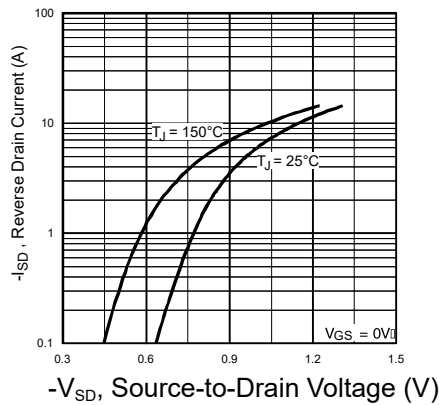


Fig 18. Typical Source-Drain Diode Forward Voltage

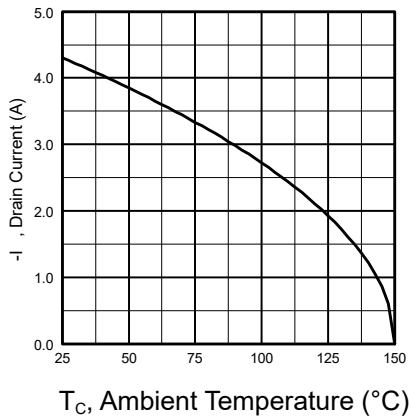


Fig 19. Maximum Drain Current Vs.AmbientTemperature

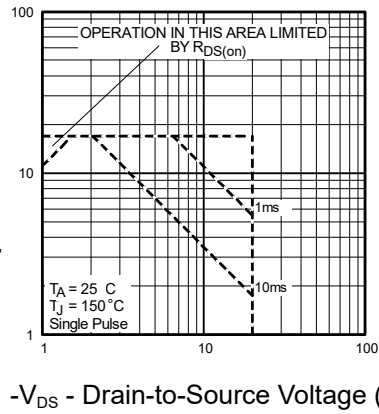


Fig 20. Maximum Safe Operating Area

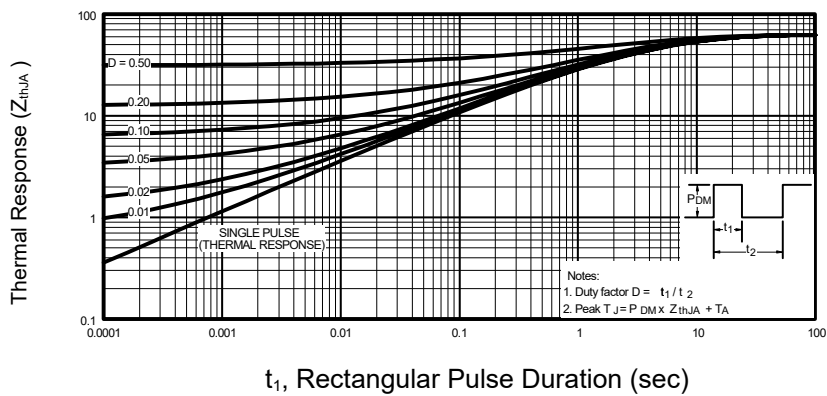
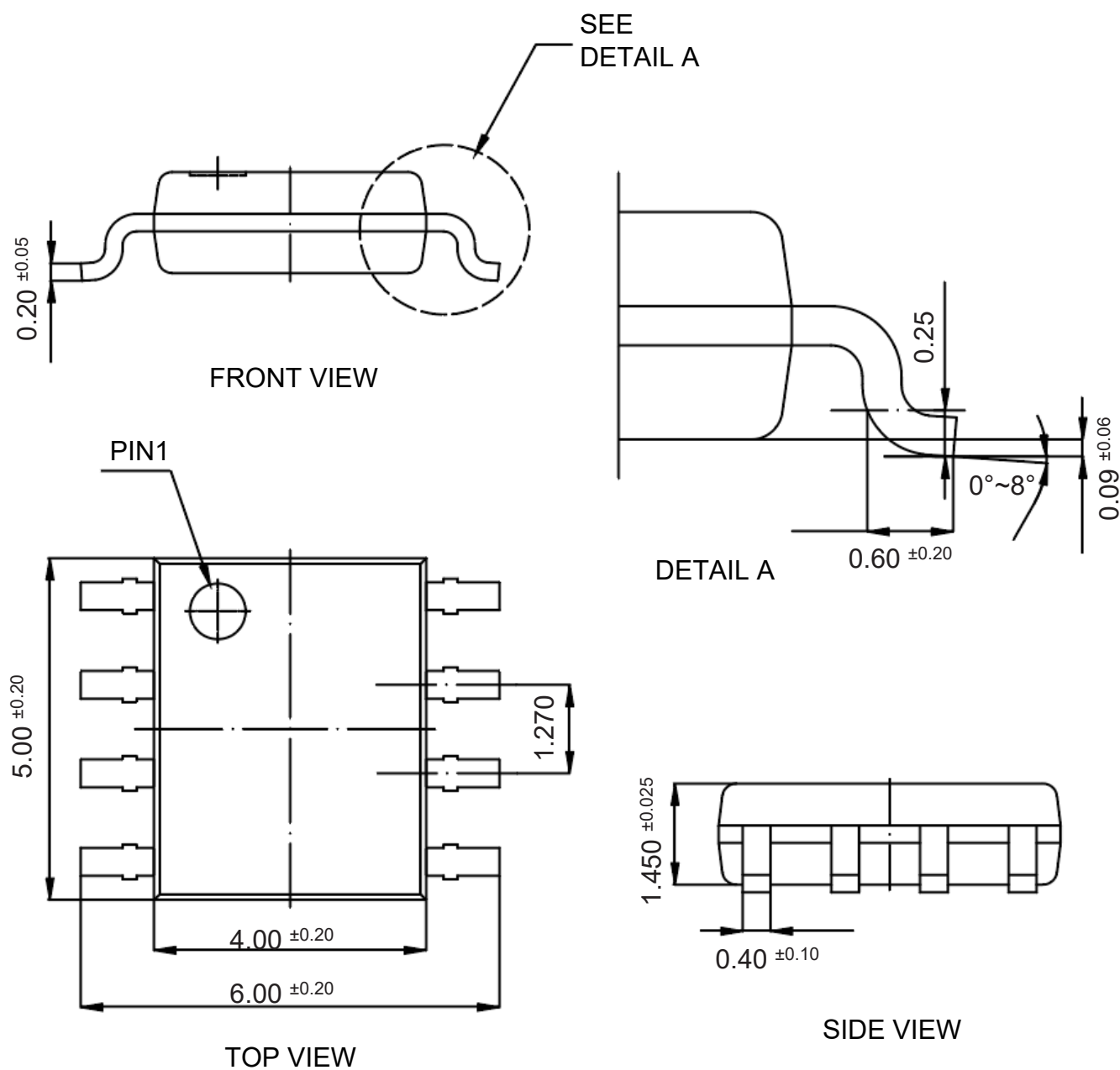


Fig 23. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Package Outline

SOP-8

Dimensions in mm

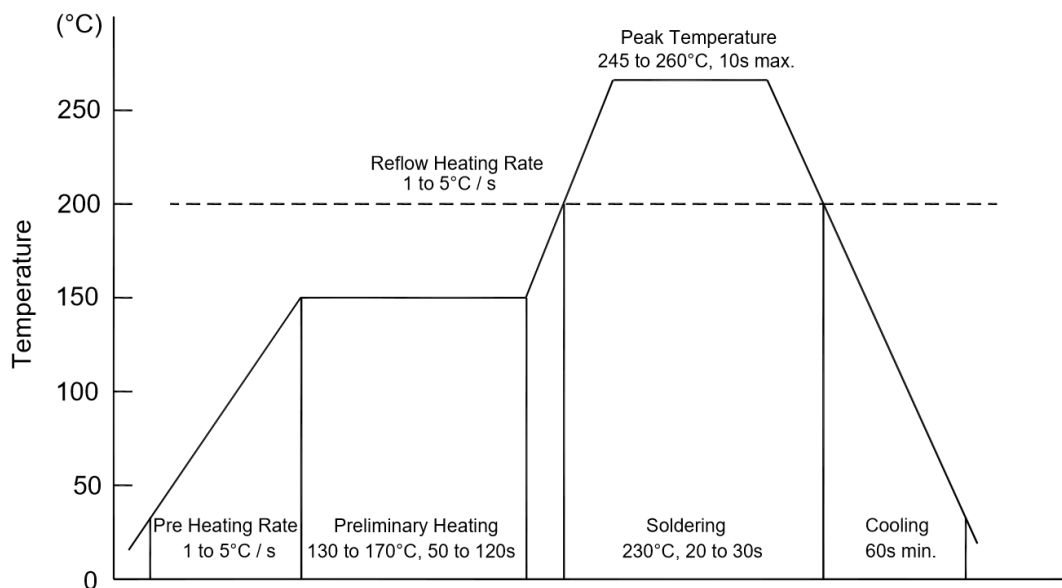


Ordering Information

Device	Package	Shipping
TN4606CJPA	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

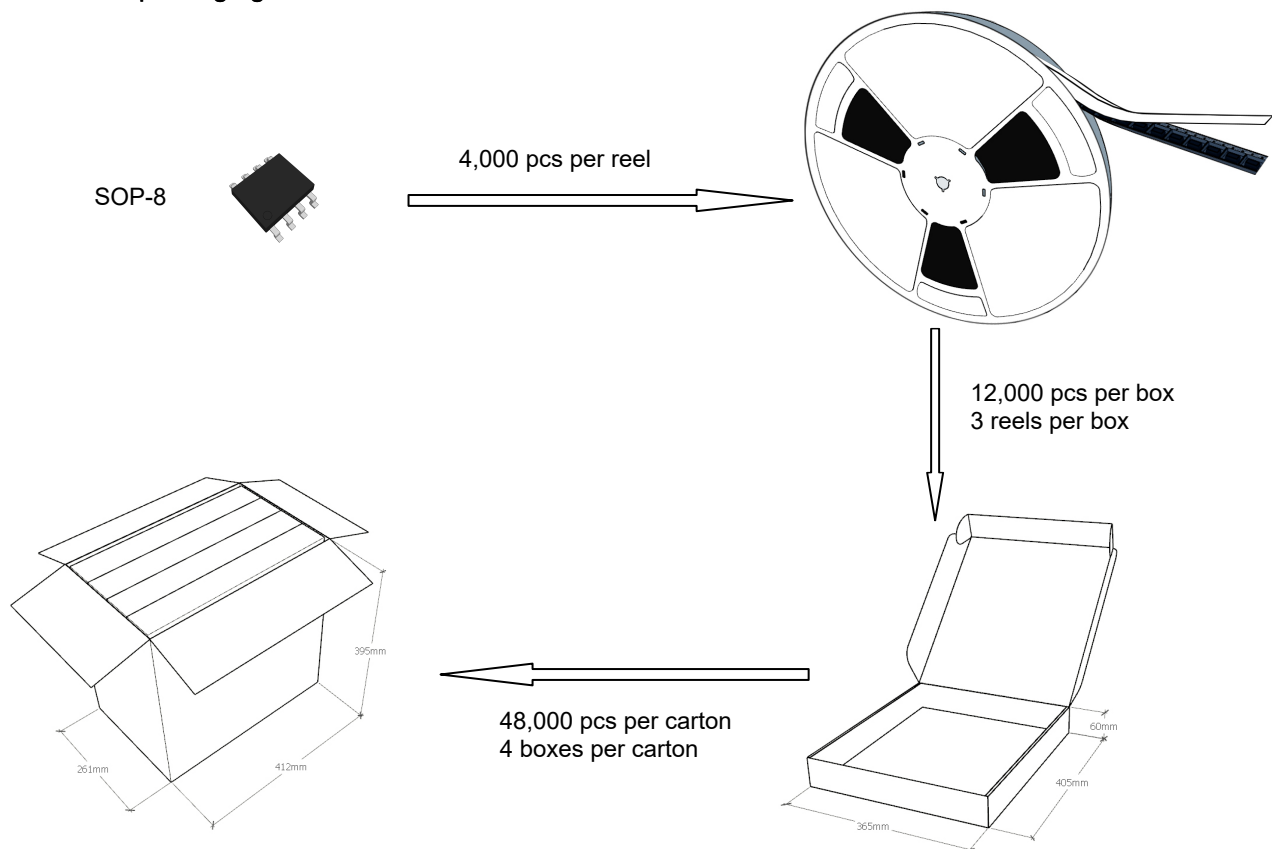
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

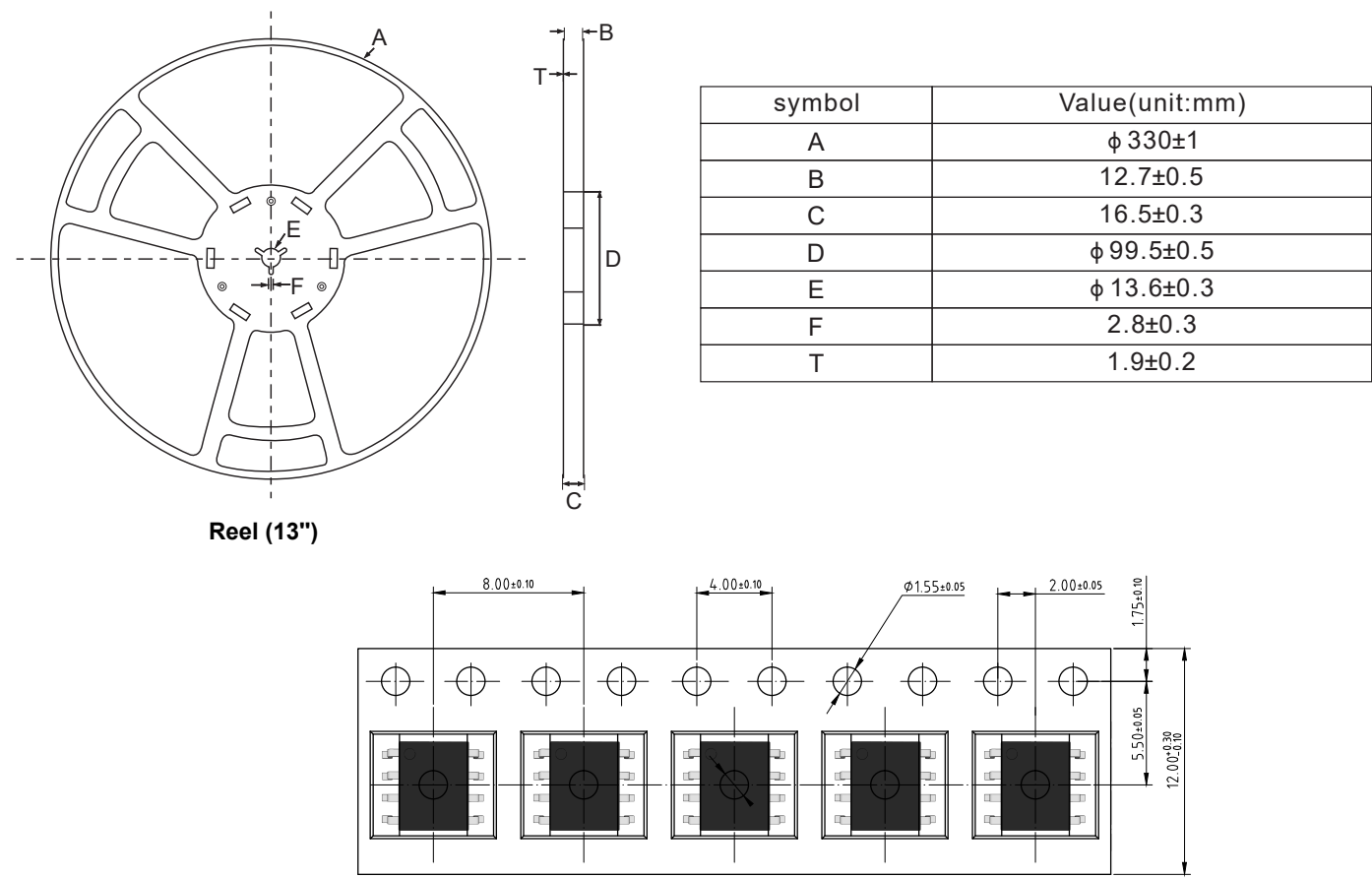
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging



◆ Embossed tape and reel data



Contact Information

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For additional information, please contact your local Sales Representative.



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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 product 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.

Users should also comply with relevant laws, regulations, policies, and standards when using the product specification. Users are responsible for the risks and liabilities arising from the use of the product specification and must ensure that it is not used for illegal purposes. Additionally, users should respect the intellectual property rights related to the product specification and refrain from infringing upon any third-party legal rights. TANI shall assume no responsibility for any disputes or controversies arising from the above-mentioned issues in any form.