

## Product Summary

- $V_{DS} = 200V, I_D = 40A$
- $R_{DS(on)} < 70m\Omega @ V_{GS} = 10V$

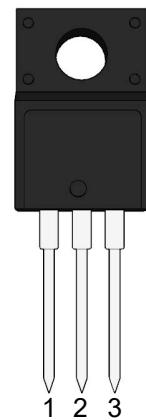
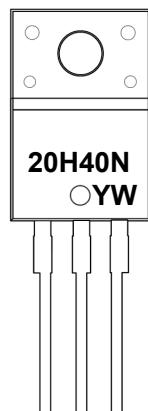
## Features

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

## Application

- Switch Mode Power Supply
- Uninterruptible Power Supply

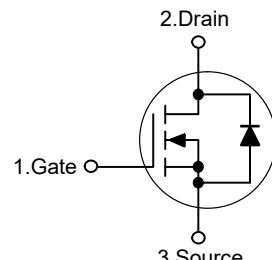
## Marking Code



(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	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	40	A
Drain Current-Pulsed <sup>Note1</sup>	$I_{DM}$	156	A
Maximum Power Dissipation	$P_D$	37	W
Single Pulse Avalanche Energy <sup>Note2</sup>	$E_{AS}$	860	mJ
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C

## Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{eJC}$	3.4	°C/W
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## Electrical Characteristics

(T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	200	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C	--	0.2	--	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 200 V, V <sub>GS</sub> = 0 V V <sub>DS</sub> = 160 V, T <sub>C</sub> = 125°C	-- --	-- 10	1 10	μA μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V	--	--	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V	--	--	-100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	3.0	--	5.0	V
R <sub>D(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 19.5 A	--	0.056	0.066	Ω
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 40 V, I <sub>D</sub> = 19.5 A	--	28.5	--	S
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	--	1640	2130	pF
C <sub>oss</sub>	Output Capacitance		--	400	520	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	57	85	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 100 V, I <sub>D</sub> = 39 A, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 25 Ω	--	30	70	ns
t <sub>r</sub>	Turn-On Rise Time		--	160	330	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	150	310	ns
t <sub>f</sub>	Turn-Off Fall Time		--	150	310	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 160 V, I <sub>D</sub> = 39 A, V <sub>GS</sub> = 10 V	--	38	49	nC
Q <sub>gs</sub>	Gate-Source Charge		--	11	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	16.5	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		--	--	39	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		--	--	156	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 39 A	--	--	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 39 A, dI <sub>F</sub> /dt = 100 A/μs	--	152	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	1.1	--	μC

## Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.

2. L = 0.85 mH, I<sub>AS</sub> = 39 A, V<sub>DD</sub> = 50 V, R<sub>G</sub> = 25 Ω, starting T<sub>J</sub> = 25°C.3. I<sub>SD</sub> ≤ 39 A, dI/dt ≤ 200 A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, starting T<sub>J</sub> = 25°C.

4. Essentially independent of operating temperature typical characteristics.

## Typical Characteristic Curves

Figure 1. On-Region Characteristics

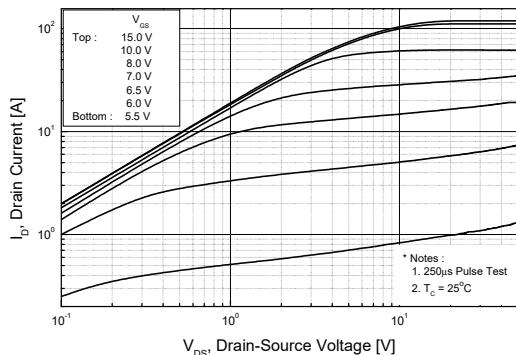


Figure 2. Transfer Characteristics

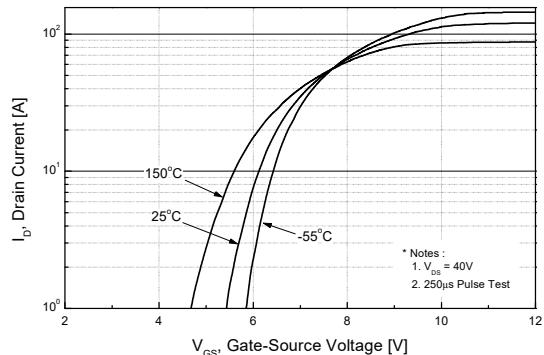


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

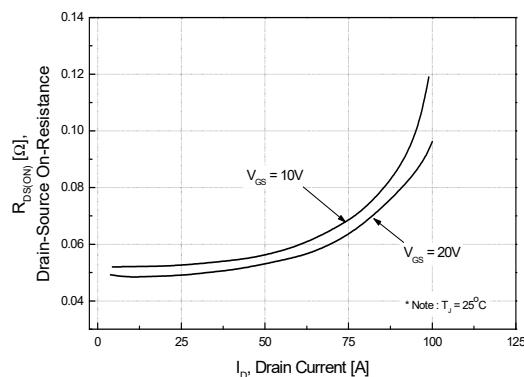


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

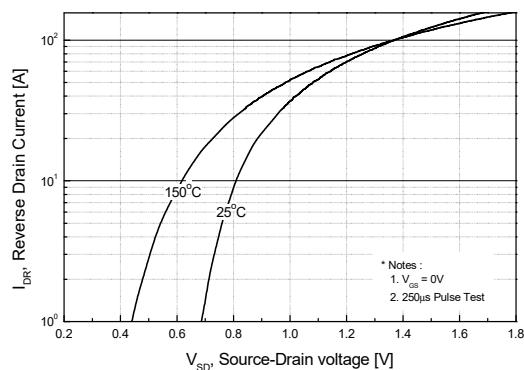


Figure 5. Capacitance Characteristics

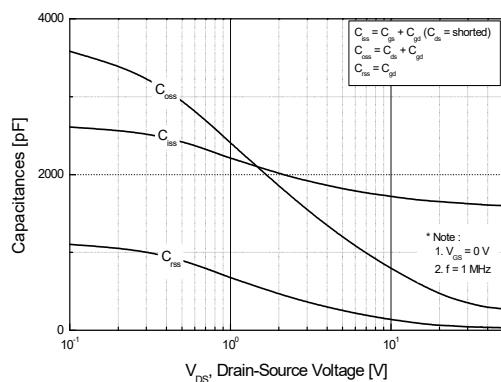
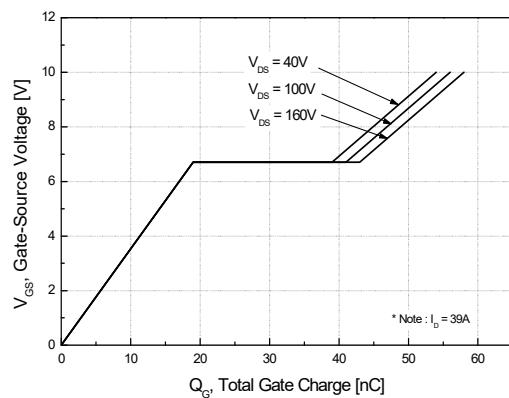
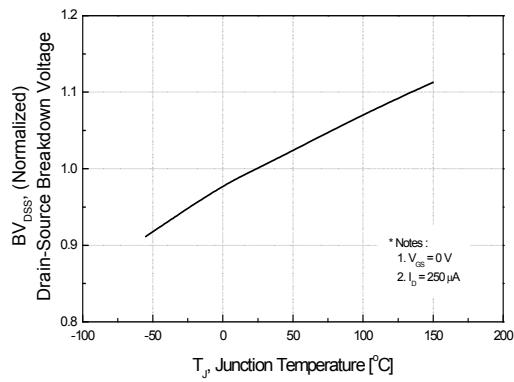


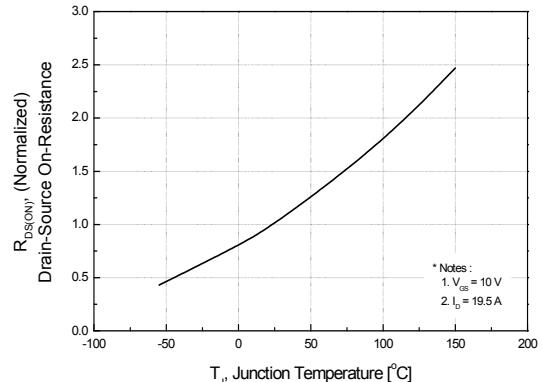
Figure 6. Gate Charge Characteristics



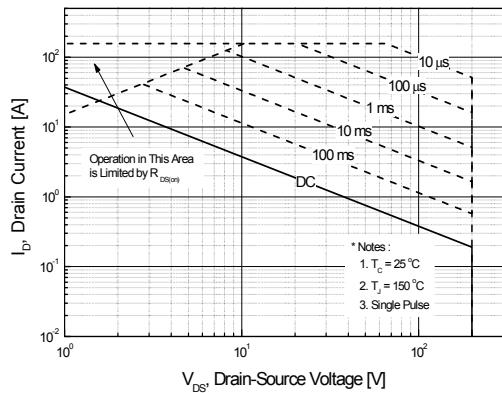
**Figure 7. Breakdown Voltage Variation vs. Temperature**



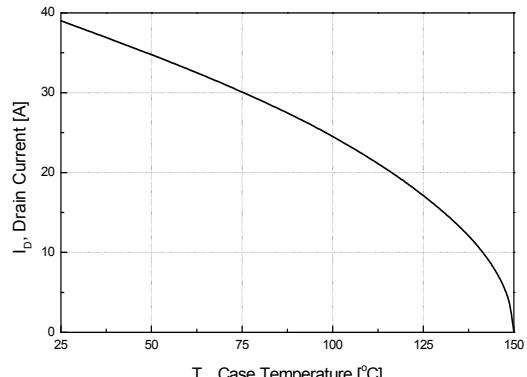
**Figure 8. On-Resistance Variation vs. Temperature**



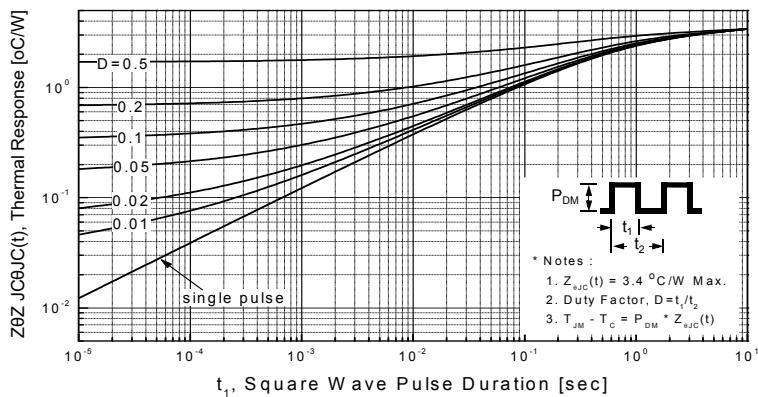
**Figure 9. Maximum Safe Operating Area**



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



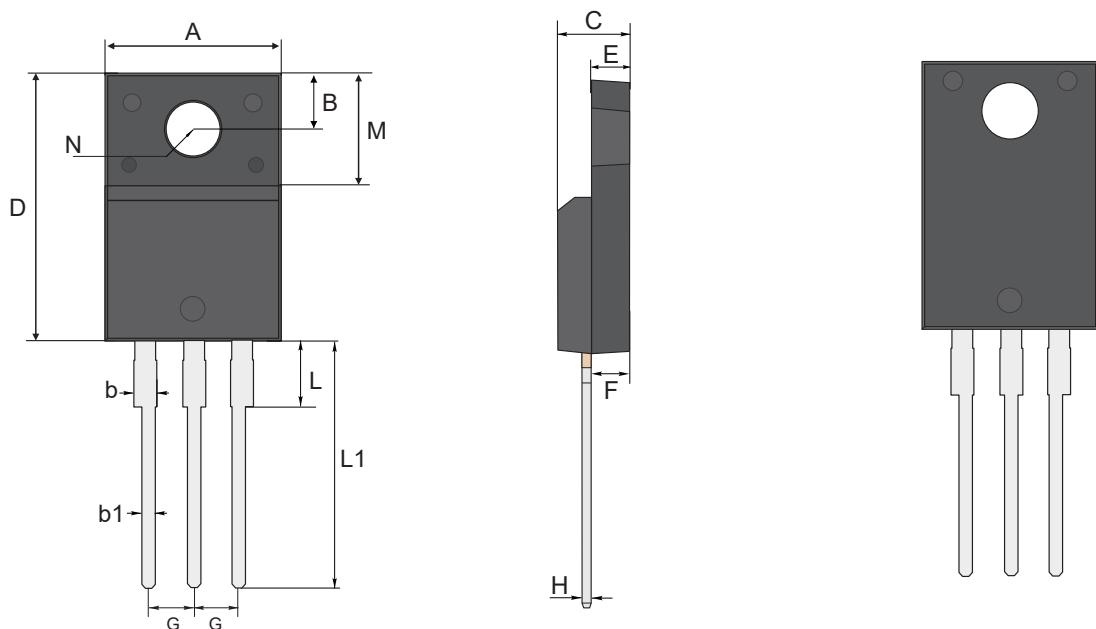
**Figure 11. Transient Thermal Response Curve**



## Package Outline

TO-220F

Dimensions in mm



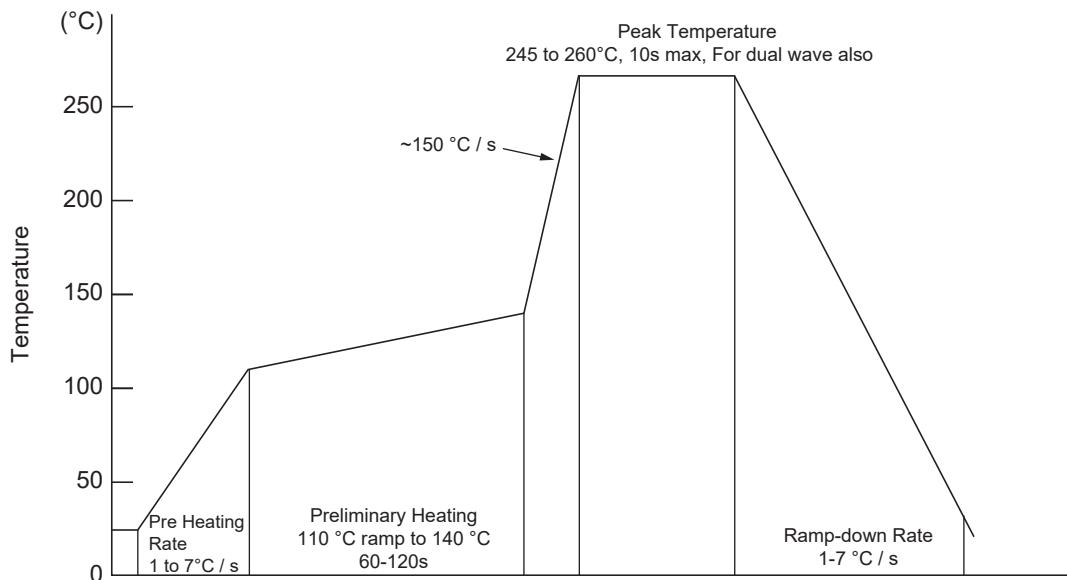
UNIT		A	B	b	b1	C	D	E	F	G	H	L	L1	M	N
mm	max	10.28	3.37	1.44	0.9	4.9	16.07	2.74	2.74	2.64	0.6	2.85	13.7	6.88	3.18 typ.
	typ	10.18	3.27	1.34	0.8	4.7	15.87	2.54	2.54	2.54	0.5	2.65	13.5	6.68	
	min	10.08	3.17	1.24	0.7	4.5	15.67	2.34	2.34	2.44	0.4	2.45	13.3	6.48	
mil	max	405	133	57	35	193	633	108	108	104	24	112	539	271	125 typ.
	typ	401	129	53	31	185	625	100	100	100	20	104	531	263	
	min	397	125	49	28	177	617	92	92	96	16	96	524	255	

## Ordering Information

Device	Package	Shipping
TN20H40NTF	TO-220F	50PCS/Tube

## Conditions of Soldering and Storage

### ◆ Wave Soldering



### ◆ Conditions of hand soldering

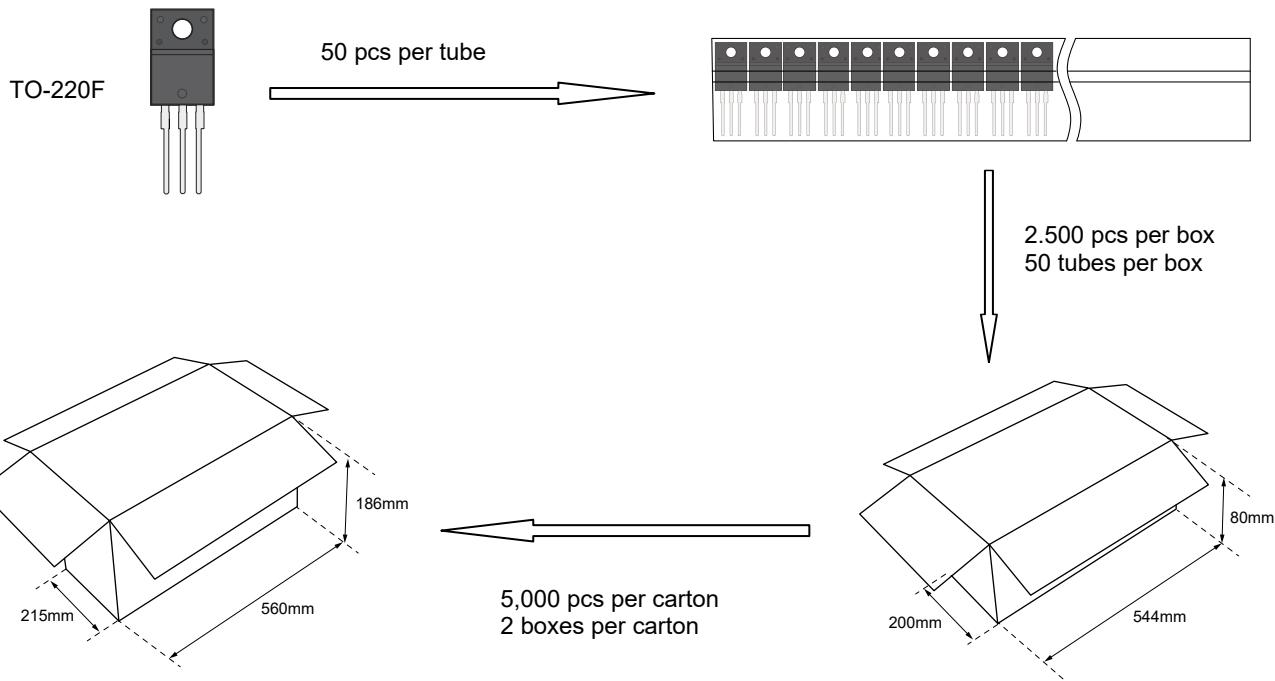
- Temperature: 360°C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

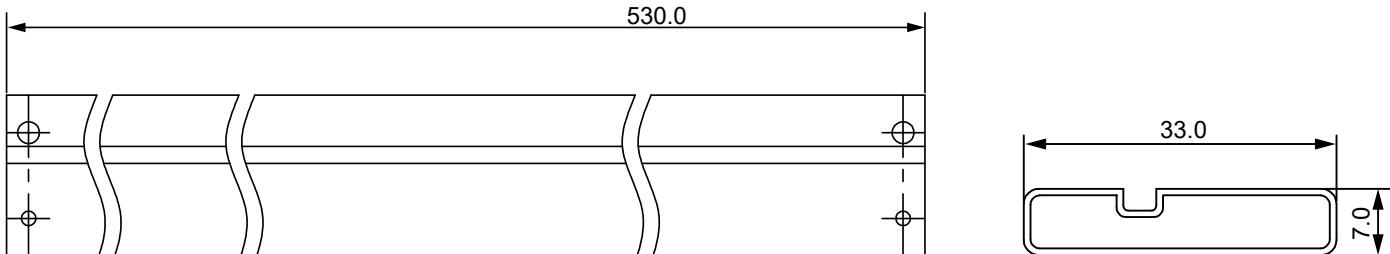
- **Temperature**  
5 to 40°C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

## Package Specifications

- The method of packaging



### ◆ Tube data



## 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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### 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.

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