

# TN50H20NTF

## N-Channel Enhancement Mode Power MOSFET TO-220F

### Product Summary

- $V_{DS} = 500V, I_D = 20A$
- $R_{DS(on)} < 0.28\Omega @ V_{GS} = 10V$

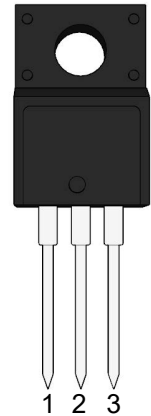
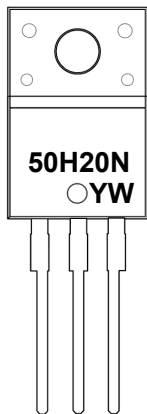
### Features

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

### Application

- Uninterruptible Power Supply
- High Frequency Switching Mode Power Supply
- Electronic Ballasts

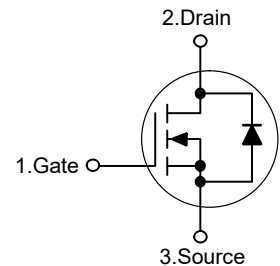
### Marking Code



(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	$V_{DS}$	500	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current-Continuous	$I_D$	20	A
Drain Current-Pulsed <sup>Note1</sup>	$I_{DM}$	80	A
Maximum Power Dissipation	$P_D$	38.5	W
Single Pulse Avalanche Energy <sup>Note2</sup>	$E_{AS}$	1620	mJ
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C

### Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.25	°C/W
--------------------------------------	-----------------	------	------

Electrical Characteristics

(T<sub>J</sub>=25°C unless o therwise s pecified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	500	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V , I <sub>D</sub> =10A	---	0.25	0.28	Ω
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	3	---	5	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =500V , V <sub>GS</sub> =0V	---	---	1	uA
		V <sub>DS</sub> =400V , V <sub>GS</sub> =0V , TC=125°C	---	---	10	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±30V , V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =15V , I <sub>D</sub> =10A	---	14	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	2	---	Ω
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =20A V <sub>DS</sub> =400V V <sub>GS</sub> = 10V (Note 3)	---	52	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	14	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	20	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DS</sub> =250V I <sub>D</sub> =20A R <sub>G</sub> =25Ω (Note 3)	---	28	---	ns
T <sub>r</sub>	Rise Time		---	54	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	68	---	
T <sub>f</sub>	Fall Time		---	37	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V , V <sub>GS</sub> =0V , f=1MHz	---	2700	---	pF
C <sub>oss</sub>	Output Capacitance		---	260	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	20	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>GS</sub> =V <sub>DS</sub> =0V , Force Current	---	---	20	A
I <sub>SM</sub>	Pulsed Source Current		---	---	80	A
V <sub>SD</sub>	Diode Forward Voltage <sup>3</sup>	V <sub>GS</sub> =0V , I <sub>F</sub> =10A , T <sub>J</sub> =25°C	---	0.82	1.5	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0V, T <sub>J</sub> = 25°C I <sub>r</sub> =20A , dI /dt=100A/μs (Note 3)	---	520	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	5.2	---	uC

Note :

1.Repetitive rating: Pulse width limited by maximum junction temperature

2.The EAS data shows Max. rating .The test condition is Vps=80V , VGS=10V , L=10mH , IAS=18A.

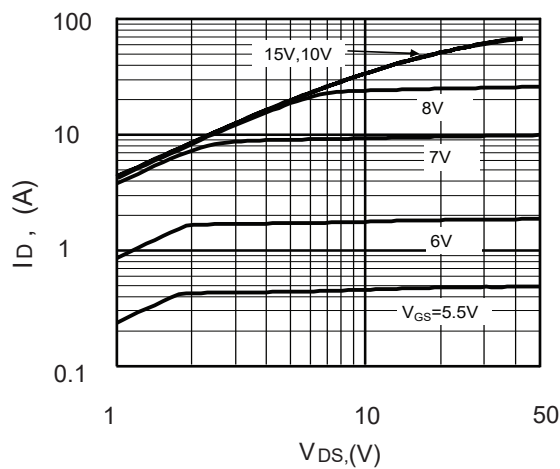
3.Pulse Test: Pulse width≤300μs, Duty Cycle≤2%

This product has been designed and qualified for the counsumer market.

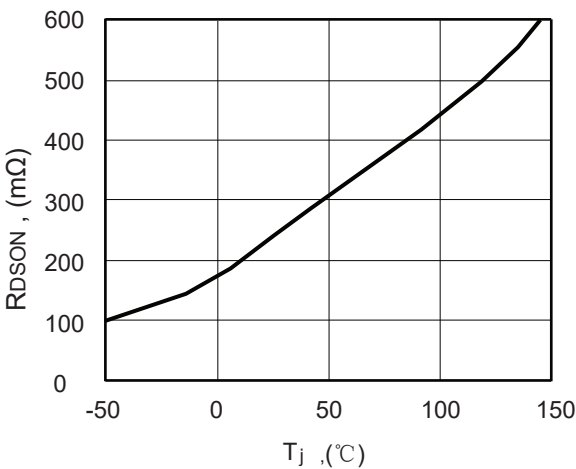
Cmos assumes no liability for customers' product design or applications.

Cmos reserver the right to improve product design ,functions and reliability wihtout notice.

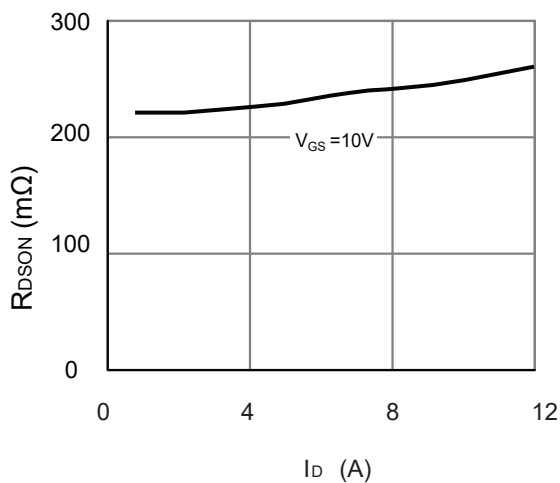
Typical Characteristic Curves



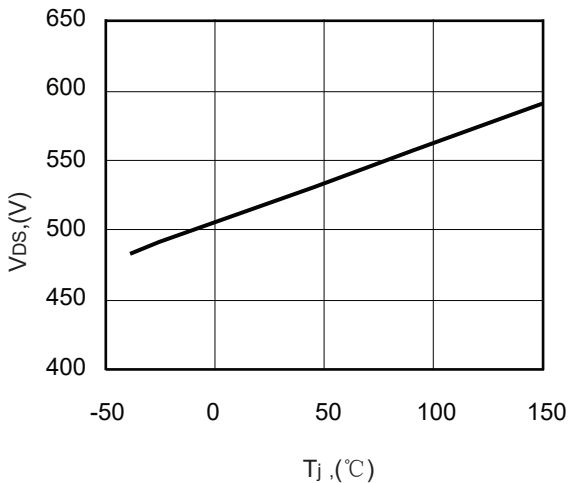
On-Region Characteristics



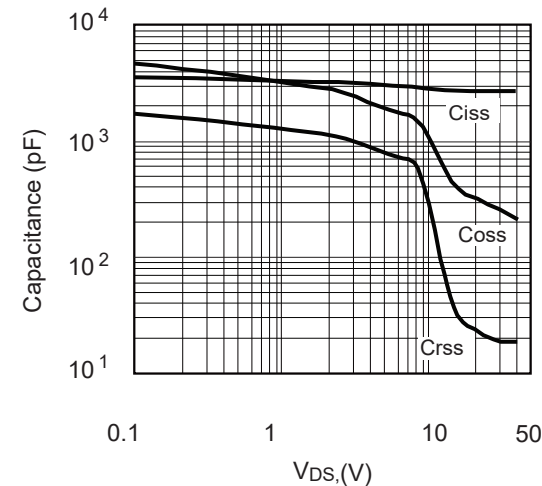
On-Resistance Vs. Temperature



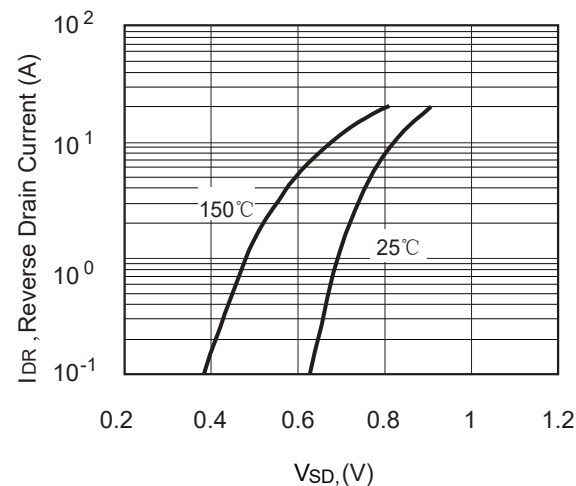
drain-source on-resistance



Breakdown Voltage Variation



Capacitance Characteristics

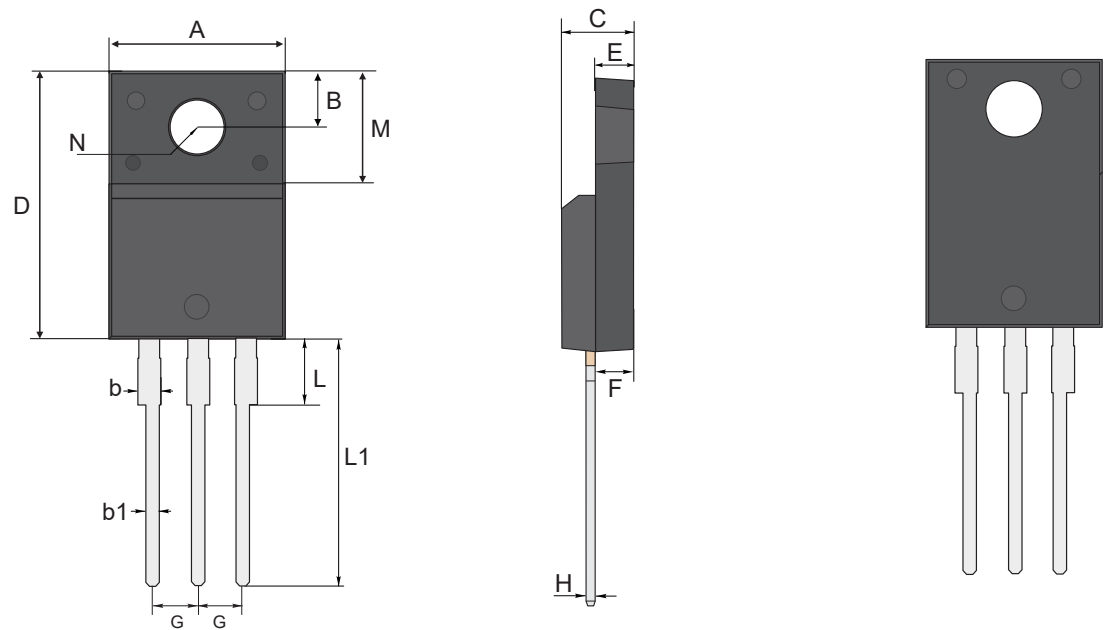


Body Diode Forward Voltage

Package Outline

TO-220F

Dimensions in mm



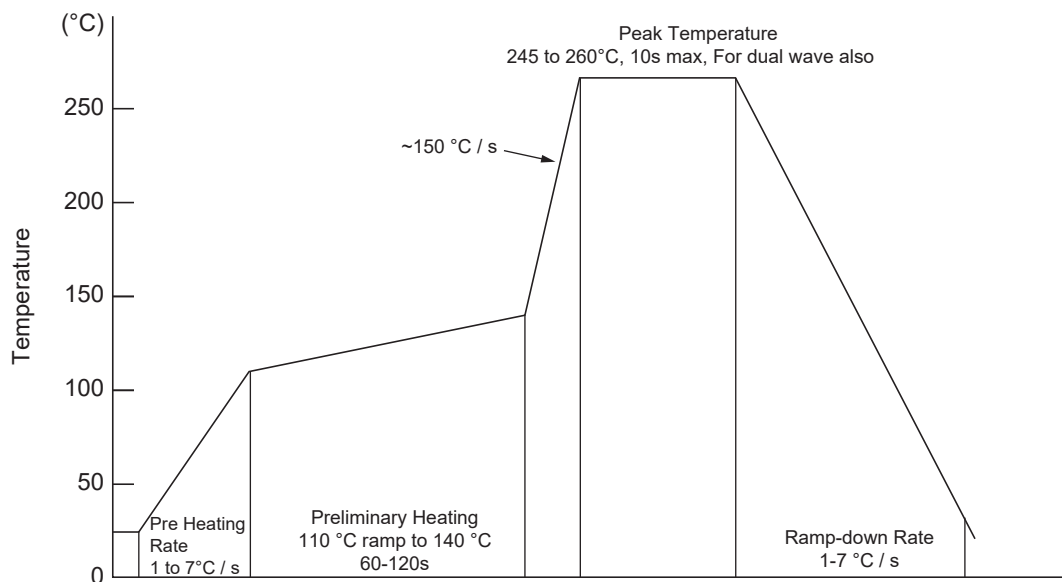
UNIT		A	B	b	b1	C	D	E	F	G	H	L	L1	M	N
mm	max	10.28	3.37	1.44	0.9	4.9	16.07	2.74	2.74	2.64	0.6	2.85	13.7	6.88	3.18 typ.
	typ	10.18	3.27	1.34	0.8	4.7	15.87	2.54	2.54	2.54	0.5	2.65	13.5	6.68	
	min	10.08	3.17	1.24	0.7	4.5	15.67	2.34	2.34	2.44	0.4	2.45	13.3	6.48	
mil	max	405	133	57	35	193	633	108	108	104	24	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
TN50H20NTF	TO-220F	50PCS/Tube

## Conditions of Soldering and Storage

### ◆ Wave Soldering



### ◆ Conditions of hand soldering

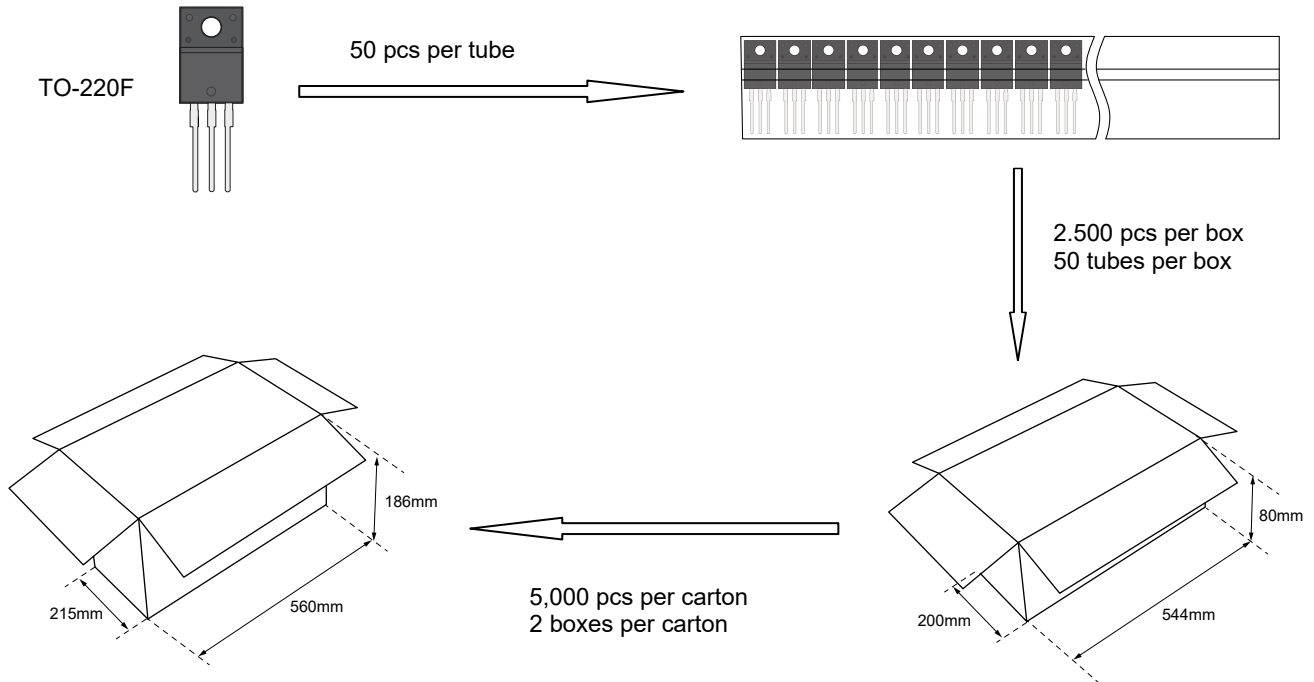
- Temperature: 360°C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

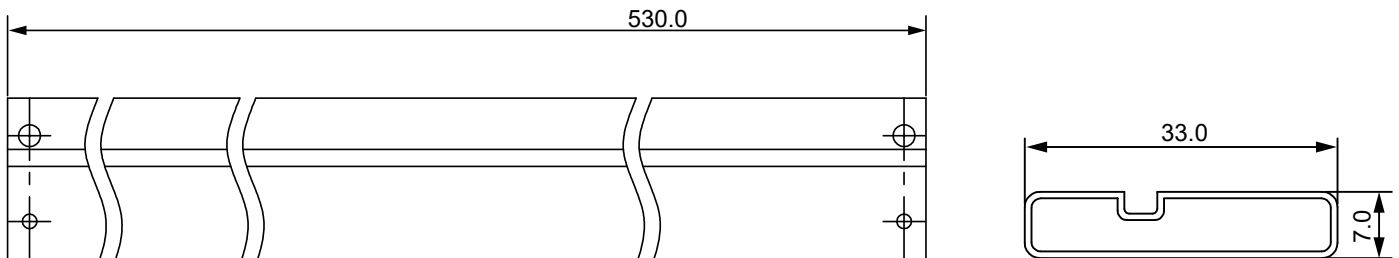
- **Temperature**  
5 to 40°C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

## 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.



® is registered trademarks of TANI Corporation.

### 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.