

TN20H40NTF

N-Channel Enhancement Mode Power MOSFET

Product Summary

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

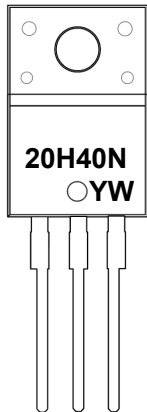
Features

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

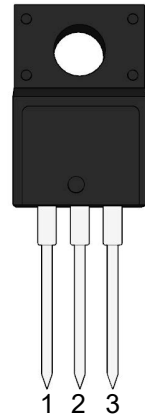
Application

- Switch Mode Power Supply
- Uninterruptible Power Supply

Marking Code



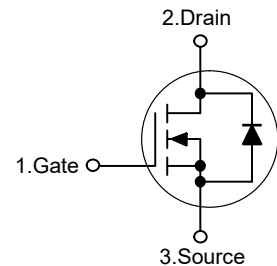
TO-220F



(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}	± 20	V
Drain Current-Continuous	I_D	40	A
Drain Current-Pulsed ^{Note1}	I_{DM}	156	A
Maximum Power Dissipation	P_D	37	W
Single Pulse Avalanche Energy ^{Note2}	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	$R_{\theta JC}$	3.4	°C/W
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Electrical Characteristics

(T_J=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	200	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C	--	0.2	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 200 V, V _{GS} = 0 V V _{DS} = 160 V, T _C = 125°C	-- --	-- --	1 10	μA μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	3.0	--	5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 19.5 A	--	0.056	0.066	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 19.5 A	--	28.5	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	1640	2130	pF
C _{Oss}	Output Capacitance		--	400	520	pF
C _{rss}	Reverse Transfer Capacitance		--	57	85	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 100 V, I _D = 39 A, V _{GS} = 10 V, R _G = 25 Ω (Note 4)	--	30	70	ns
t _r	Turn-On Rise Time		--	160	330	ns
t _{d(off)}	Turn-Off Delay Time		--	150	310	ns
t _f	Turn-Off Fall Time		--	150	310	ns
Q _g	Total Gate Charge	V _{DS} = 160 V, I _D = 39 A, V _{GS} = 10 V (Note 4)	--	38	49	nC
Q _{gs}	Gate-Source Charge		--	11	--	nC
Q _{gd}	Gate-Drain Charge		--	16.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	39	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	156	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 39 A	--	--	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 39 A, dI _F /dt = 100 A/μs	--	152	--	ns
Q _{rr}	Reverse Recovery Charge		--	1.1	--	μC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. L = 0.85 mH, I_{AS} = 39 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 39 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

Typical Characteristic Curves

Figure 1. On-Region Characteristics

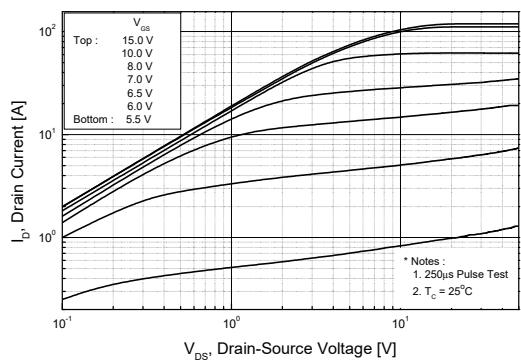


Figure 2. Transfer Characteristics

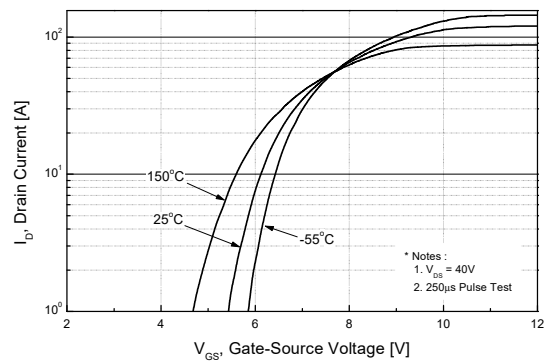


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

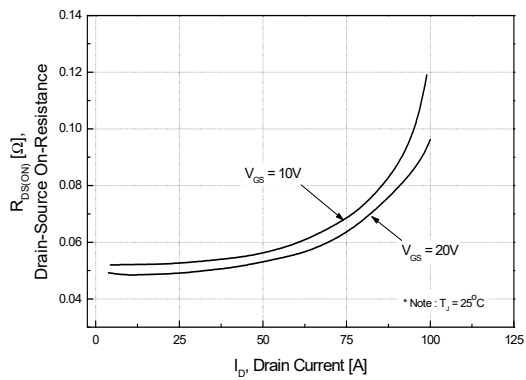


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

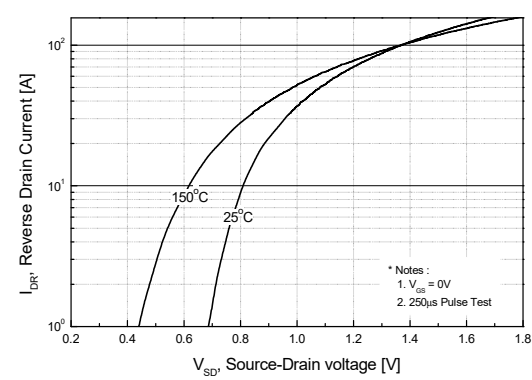


Figure 5. Capacitance Characteristics

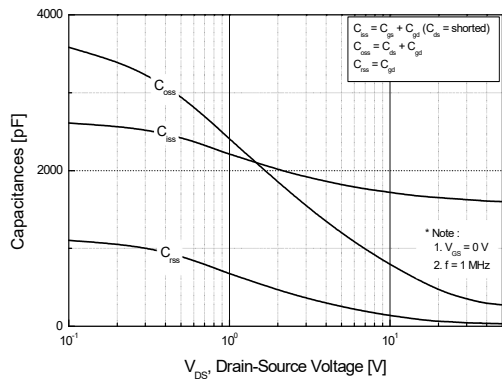


Figure 6. Gate Charge Characteristics

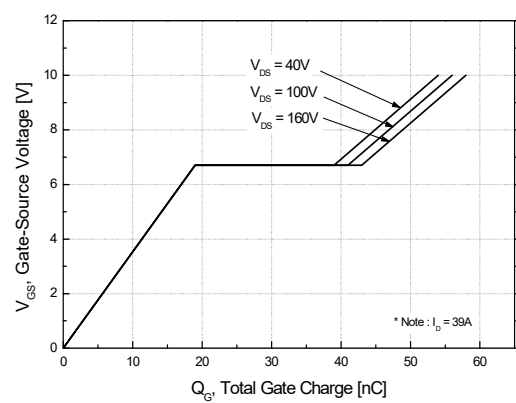


Figure 7. Breakdown Voltage Variation vs. Temperature

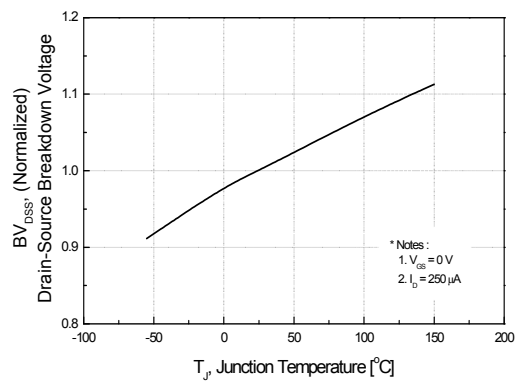


Figure 8. On-Resistance Variation vs. Temperature

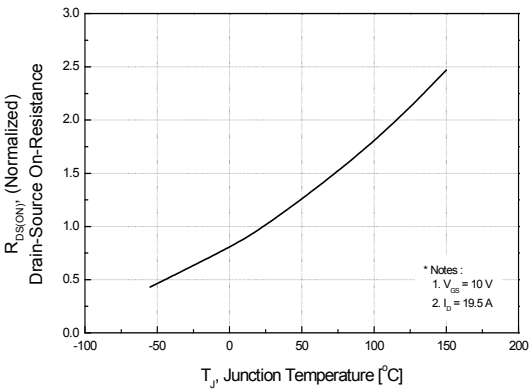


Figure 9. Maximum Safe Operating Area

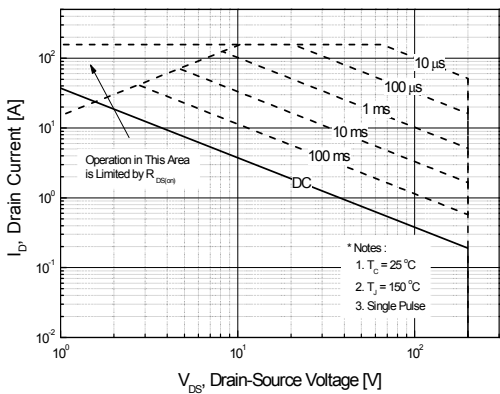


Figure 10. Maximum Drain Current vs. Case Temperature

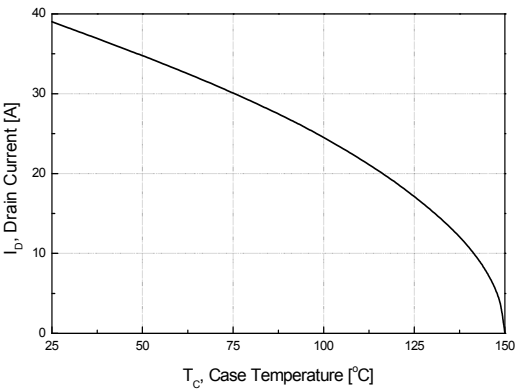
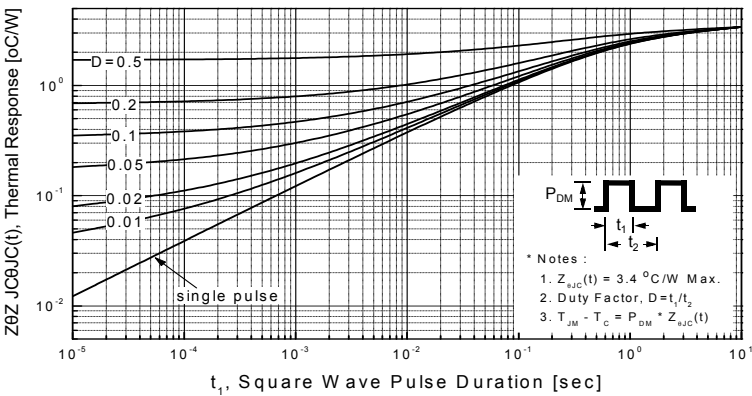


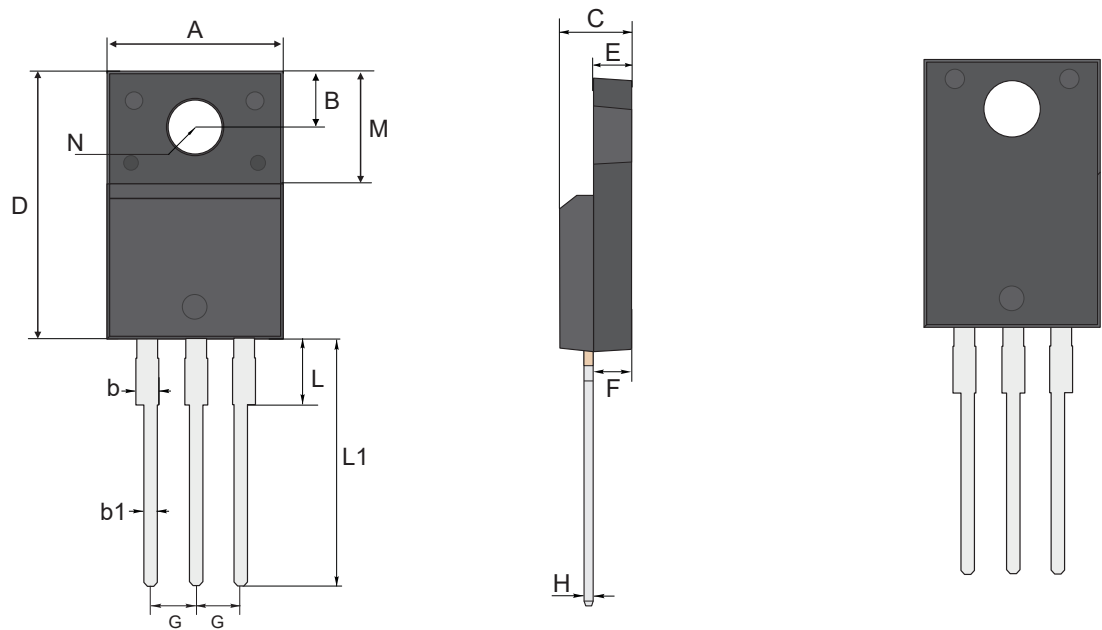
Figure 11. Transient Thermal Response Curve



Package Outline

TO-220F

Dimensions in mm



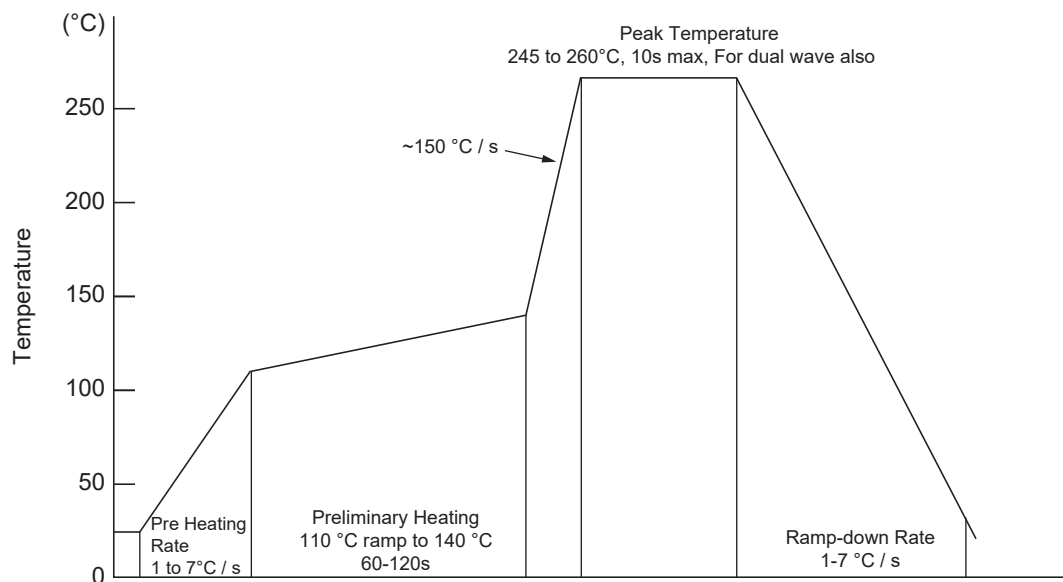
UNIT		A	B	b	b1	C	D	E	F	G	H	L	L1	M	N
mm	max	10.28	3.37	1.44	0.9	4.9	16.07	2.74	2.74	2.64	0.6	2.85	13.7	6.88	3.18 typ.
	typ	10.18	3.27	1.34	0.8	4.7	15.87	2.54	2.54	2.54	0.5	2.65	13.5	6.68	
	min	10.08	3.17	1.24	0.7	4.5	15.67	2.34	2.34	2.44	0.4	2.45	13.3	6.48	
mil	max	405	133	57	35	193	633	108	108	104	24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

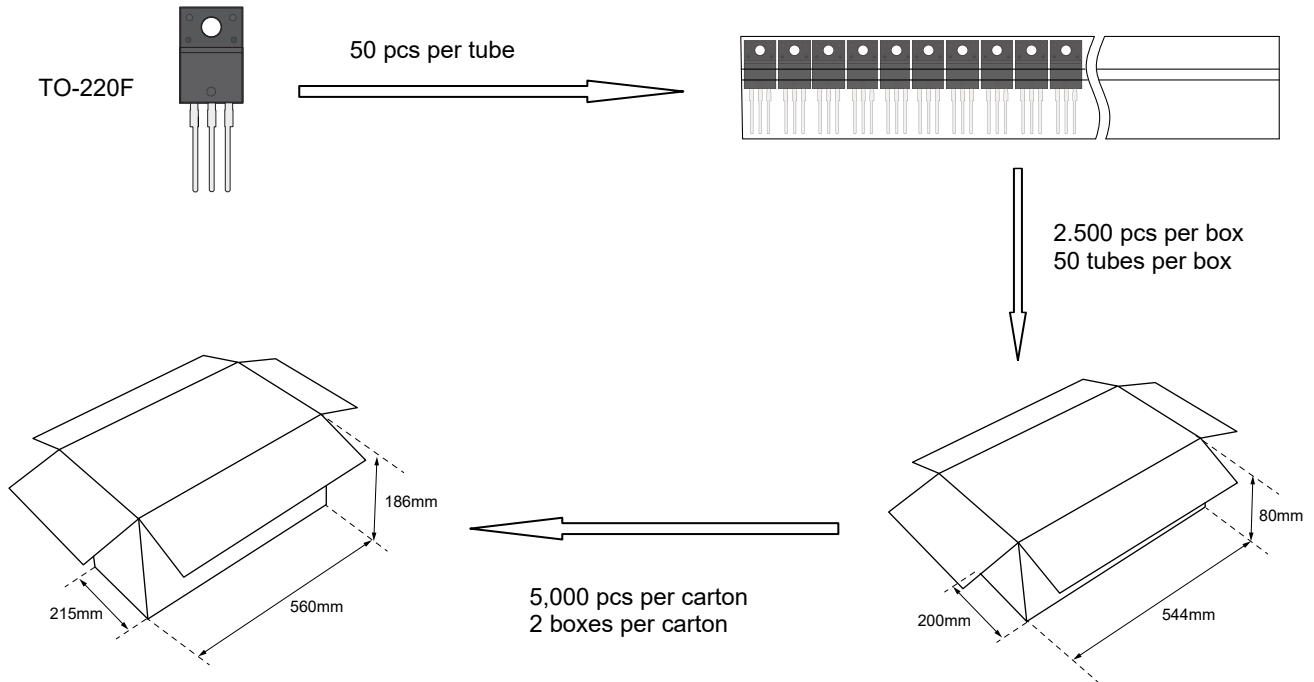
- Temperature: 360°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

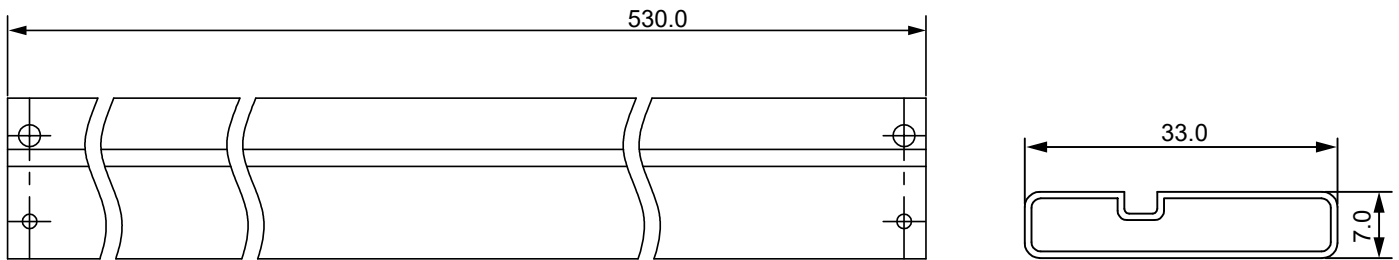
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging




◆ Tube data



Contact Information

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For additional information, please contact your local Sales Representative.

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