

TN50H05NTF

N-Channel Enhancement Mode Power MOSFET TO-220F

Product Summary

- $V_{DS}=500V, I_D=5A$
- $R_{DS(on)} < 1.5\Omega @ V_{GS}=10V$

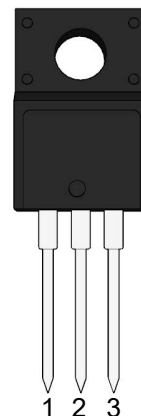
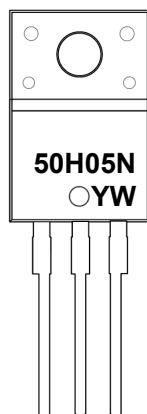
Features

- 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 Ballast

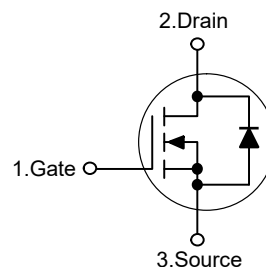
Marking Code



(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}	± 30	V
Drain Current-Continuous	I_D	5	A
Drain Current-Pulsed ^{Note1}	I_{DM}	20	A
Maximum Power Dissipation	P_D	33	W
Single Pulse Avalanche Energy ^{Note2}	E_{AS}	150	mJ
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.75	°C/W
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Electrical Characteristics

(T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	500	-	-	V
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I _D = 250μA	-	0.5	-	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 500V, V _{GS} = 0V	-	-	1	μA
		V _{DS} = 400V, T _C = 125°C	-	-	10	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} = 0V, V _{GS} = ±30V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage ^{note4}	V _{DS} = V _{GS} , I _D = 250μA	2	-	4	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D = 2.5A	-	-	1.4	Ω
g _{FS}	Forward Transconductance	V _{DS} =30V, I _D = 2.5A	-	3.0	-	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	-	586	-	pF
C _{oss}	Output Capacitance		-	58.8	-	pF
C _{rss}	Reverse Transfer Capacitance		-	3.2	-	pF
Q _g	Total Gate Charge	V _{DD} = 400V, I _D = 5A, V _{GS} = 10V	-	13.4	-	nC
Q _{gs}	Gate-Source Charge		-	2.77	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	4.43	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 250V, I _D = 5A, R _G = 10Ω, V _{GS} = 10V	-	12.1	-	ns
t _r	Turn-On Rise Time		-	11.5	-	ns
t _{d(off)}	Turn-Off Delay Time		-	33.3	-	ns
t _f	Turn-Off Fall Time		-	7.33	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	20	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = 5A	-	-	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _F = 5A,	-	387	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt =100A/μs	-	1.5	-	uC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 10mH, I_{AS} = 6A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 5A, di/dt ≤ 200A/μs, V_{DD} ≤ B_VDSS, Starting T_J = 25°C
4. Pulse width ≤ 300μs; duty cycle ≤ 2%.

Typical Characteristic Curves

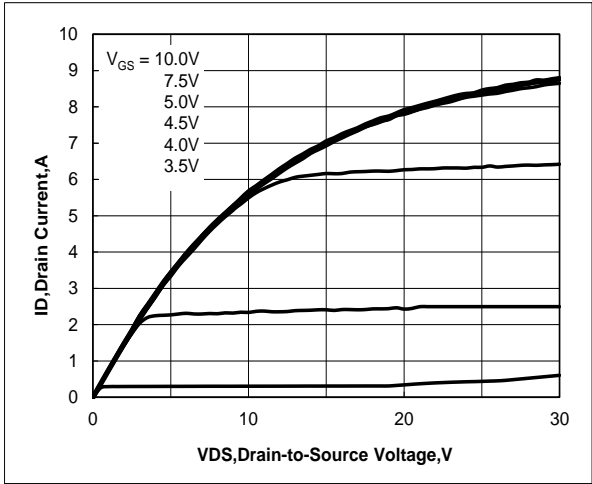


Figure 1. Output Characteristics

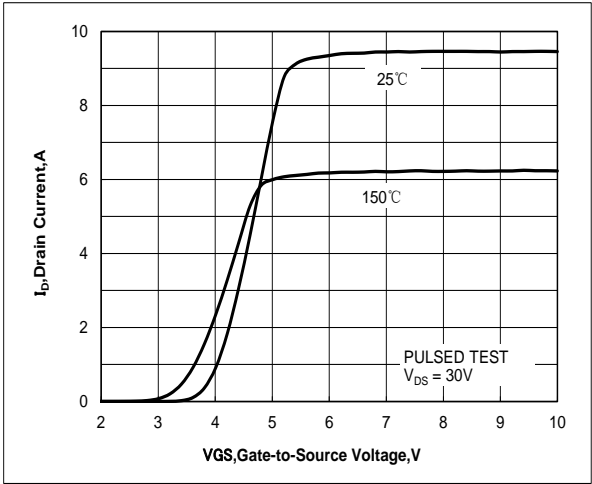


Figure 2. Transfer Characteristics

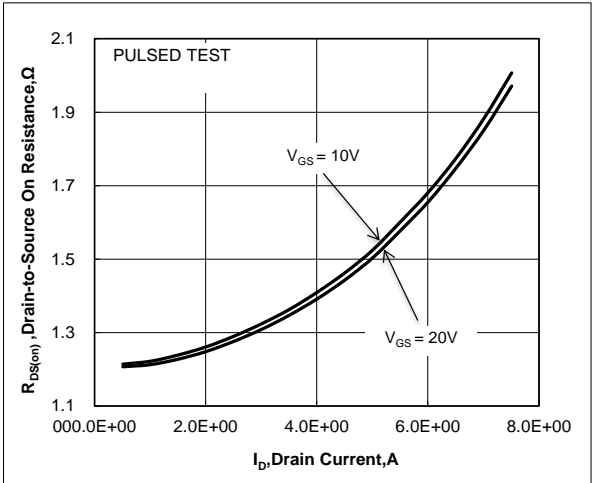


Figure 3. Drain-to-Source On Resistance vs. Drain Current and Gate Voltage

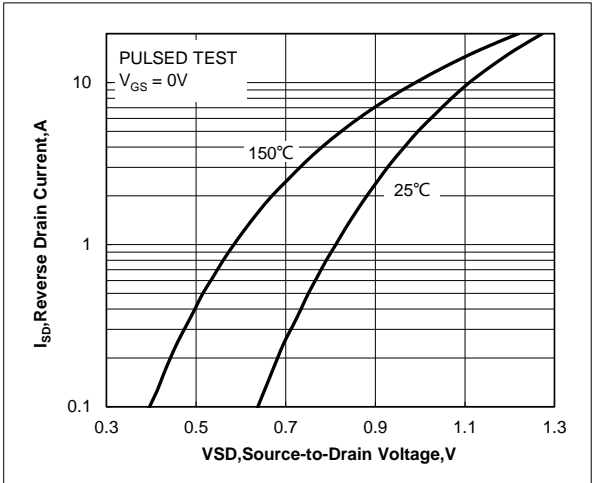


Figure 4. Body Diode Forward Voltage vs. Source Current and Temperature

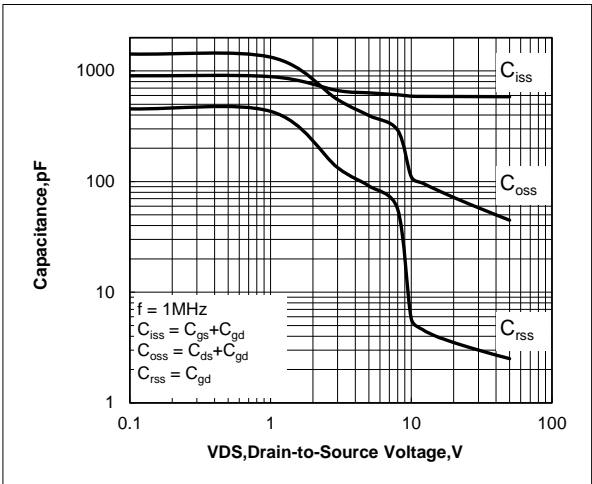


Figure 5. Capacitance Characteristics

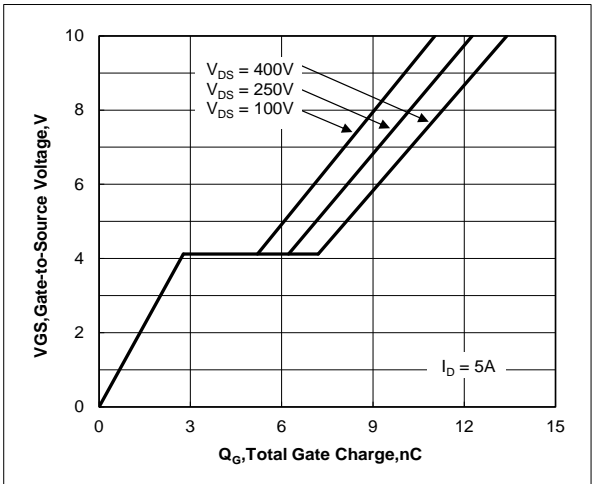


Figure 6. Gate Charge Characteristics

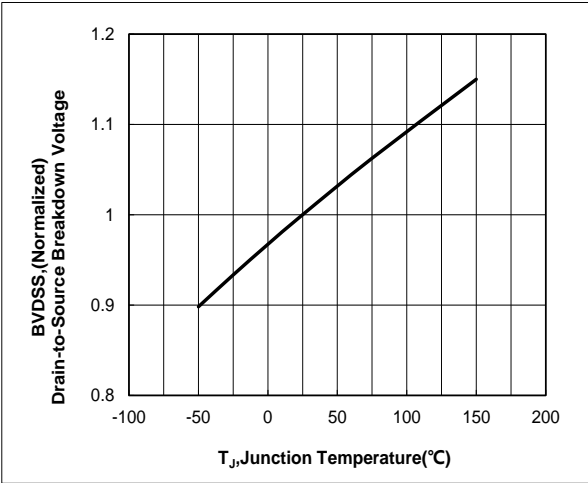


Figure 7. Normalized Breakdown Voltage vs. Junction Temperature

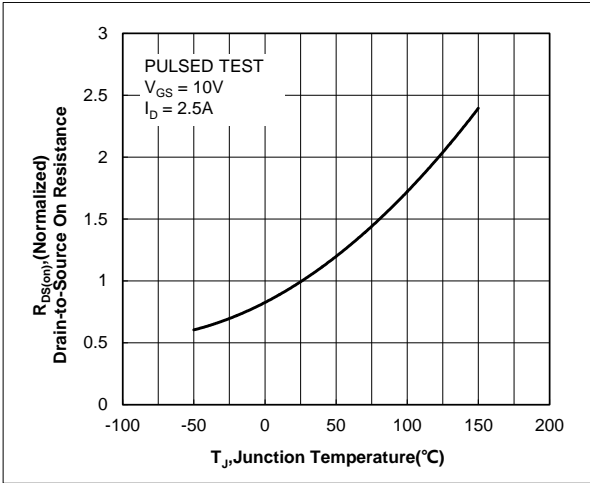


Figure 8. Normalized On Resistance vs. Junction Temperature

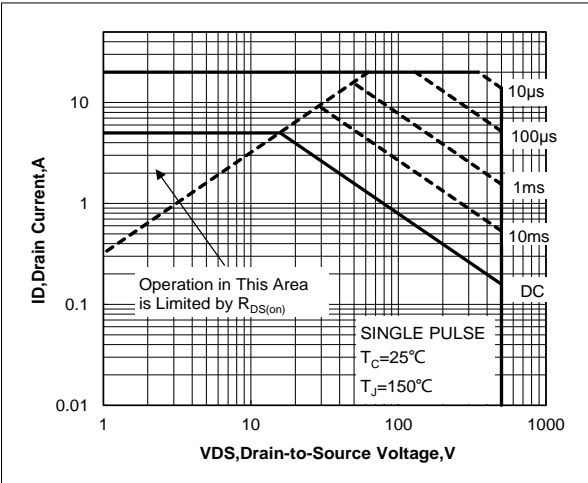


Figure 9. Maximum Safe Operating Area

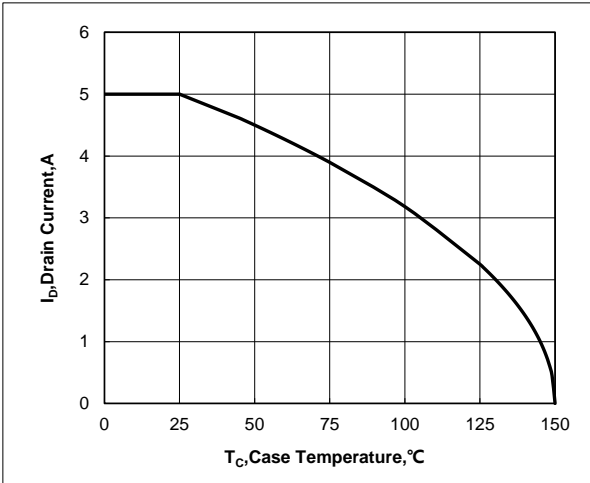


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

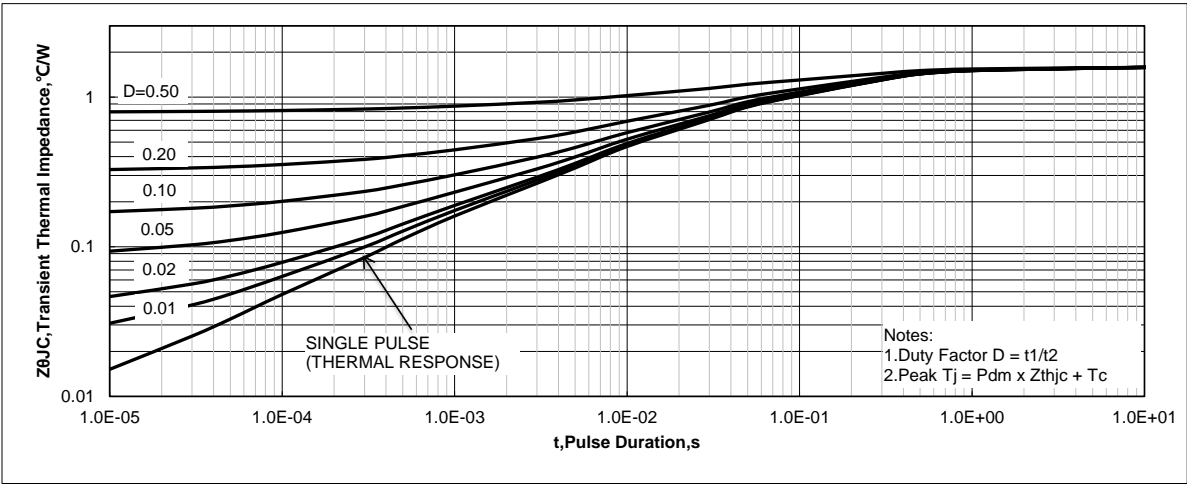
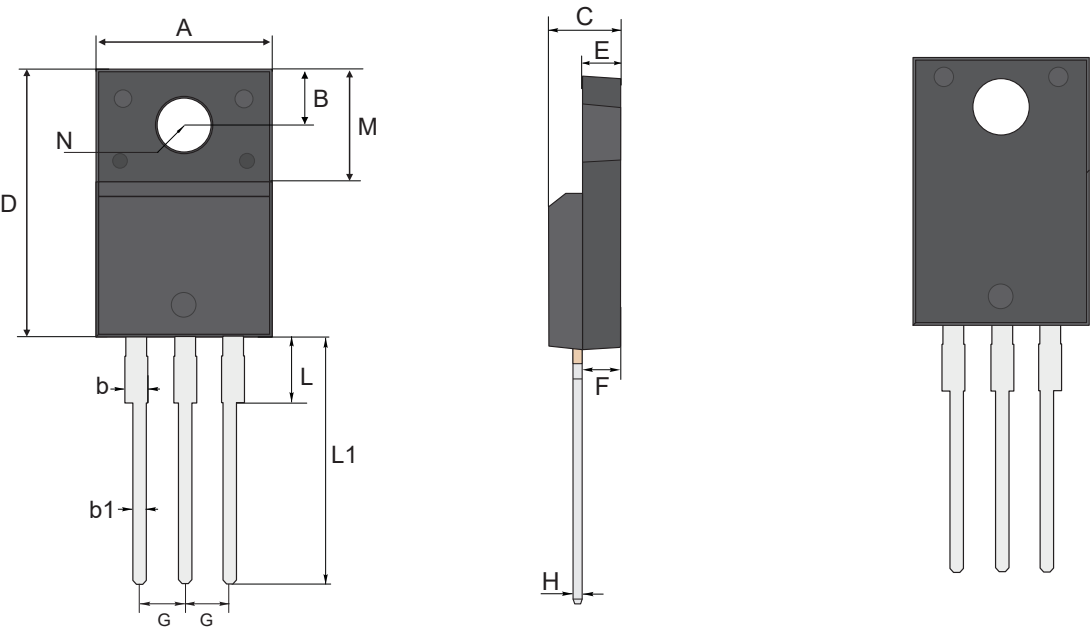


Figure 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Outline

TO-220F

Dimensions in mm



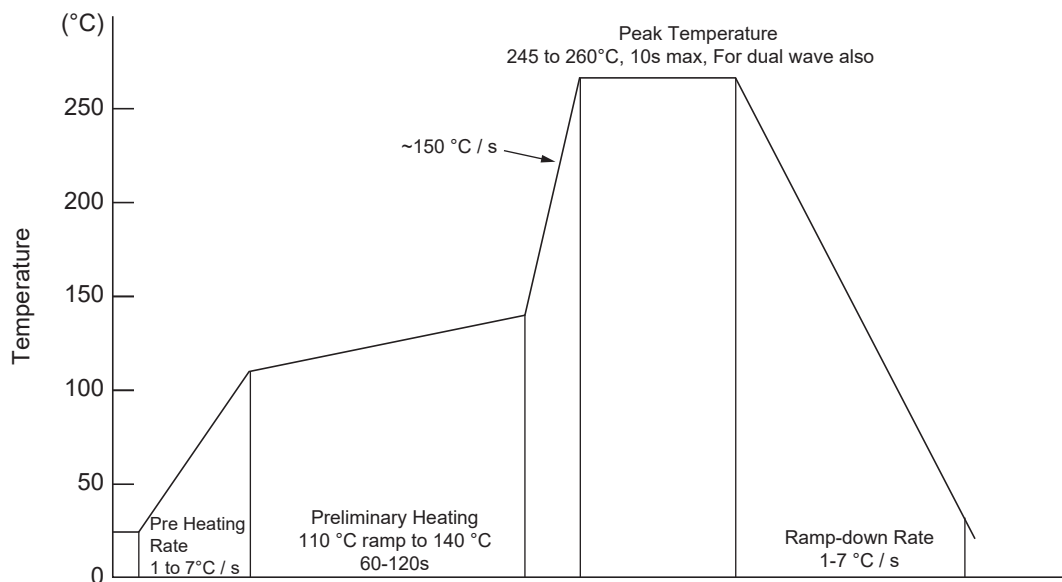
UNIT		A	B	b	b1	C	D	E	F	G	H	L	L1	M	N
mm	max	10.28	3.37	1.44	0.9	4.9	16.07	2.74	2.74	2.64	0.6	2.85	13.7	6.88	3.18 typ.
	typ	10.18	3.27	1.34	0.8	4.7	15.87	2.54	2.54	2.54	0.5	2.65	13.5	6.68	
	min	10.08	3.17	1.24	0.7	4.5	15.67	2.34	2.34	2.44	0.4	2.45	13.3	6.48	
mil	max	405	133	57	35	193	633	108	108	104	24	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
TN50H05NTF	TO-220F	50PCS/Tube

Conditions of Soldering and Storage

◆ Wave Soldering



◆ Conditions of hand soldering

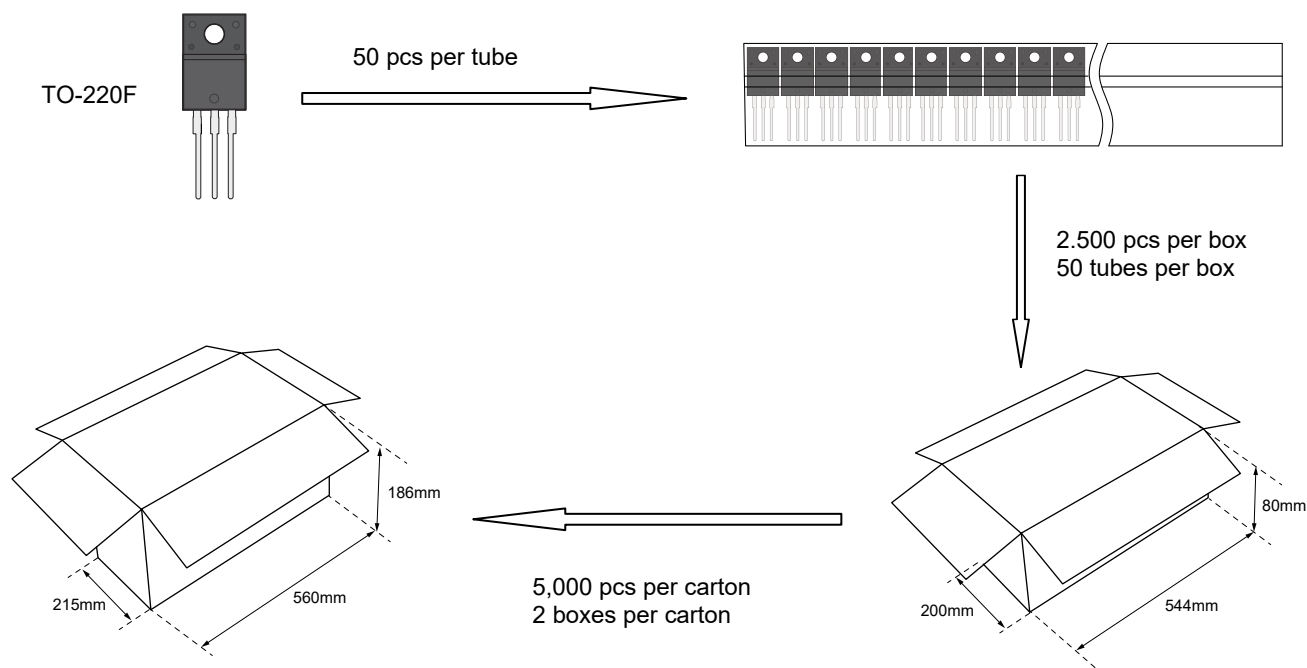
- Temperature: 360°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

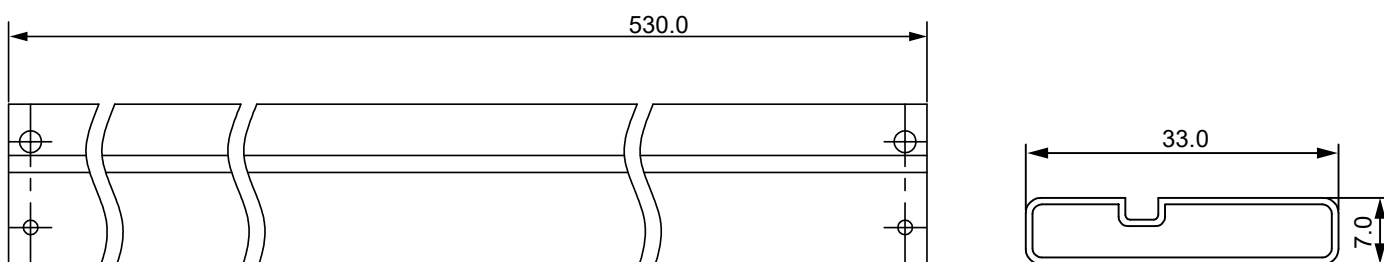
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

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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