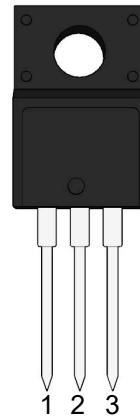


## Product Summary

- $V_{DS} = 600V, I_D = 08A$
- $R_{DS(on)} < 1.05\Omega$  @  $V_{GS} = 10V$

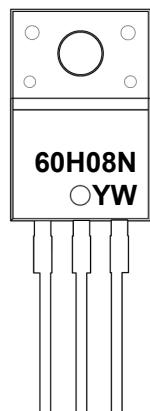
**TO-220F**

**(Top View)**

Pin	Description
1	Gate
2	Drain
3	Source

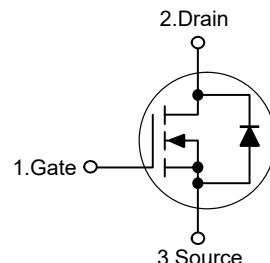
## Application

- High Efficiency Switch Mode Power Supplies
- Electronic Lamp Ballasts Based on Half Bridge
- LED Power Supplies

## Marking Code



## Schematic Diagram



## Absolute Maximum Ratings

Ratings at 25°C case temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	600	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current-Continuous	$I_D$	8	A
Drain Current-Pulsed <sup>Note1</sup>	$I_{DM}$	32	A
Maximum Power Dissipation	$P_D$	51	W
Single Pulse Avalanche Energy <sup>Note2</sup>	$E_{AS}$	600	mJ
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C

## Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{eJC}$	2.44	°C/W
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## Electrical Characteristics

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

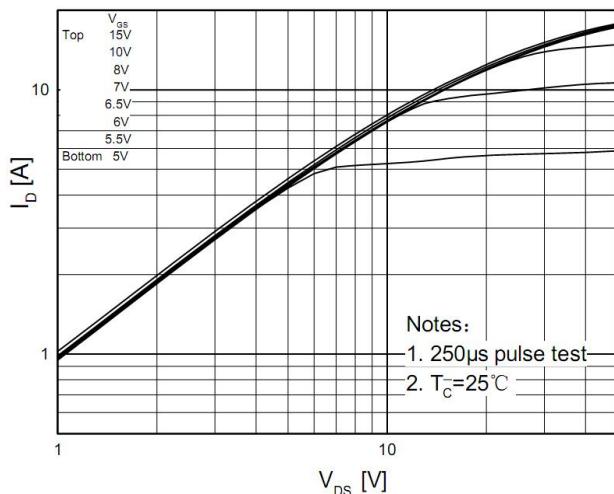
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	600	--	--	V
△BV <sub>DSS</sub> /△T <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> =250μA (Referenced to 25°C)	--	0.7	--	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	--	--	1	μA
		V <sub>DS</sub> =480V, T <sub>c</sub> =125°C	--	--	10	μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V	--	--	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	--	--	-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> =250μA	2.0	--	4.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10 V, I <sub>D</sub> =4.0A	--	1.0	1.2	Ω
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =40 V, I <sub>D</sub> =4.0A (Note4)	--	7	--	S
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	--	1400	--	pF
C <sub>oss</sub>	Output Capacitance		--	175	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	16	--	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 300 V, I <sub>D</sub> = 8.0 A, R <sub>G</sub> = 25 Ω (Note4,5)	--	13.5	--	ns
t <sub>r</sub>	Turn-On Rise Time		--	105	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	128	--	ns
t <sub>f</sub>	Turn-Off Fall Time		--	49	--	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 480 V, I <sub>D</sub> = 8.0 A, V <sub>GS</sub> = 10 V (Note4,5)	--	31	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	6.5	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	14.7	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		--	--	8.0	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		--	--	32	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 8.0A	--	--	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0V, I <sub>S</sub> = 8.0A, d I <sub>F</sub> /dt = 100A/μs (Note4)	--	325	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	2.7	--	μC

Notes:

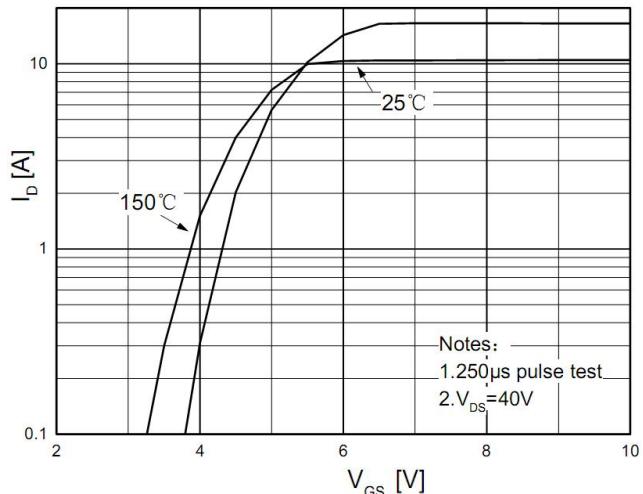
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. L = 18.5mH, I<sub>AS</sub> = 8.0A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C.
3. I<sub>SD</sub> ≤ 8.0A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C.
4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
5. Essentially Independent of Operating Temperature.

## Typical Characteristic Curves

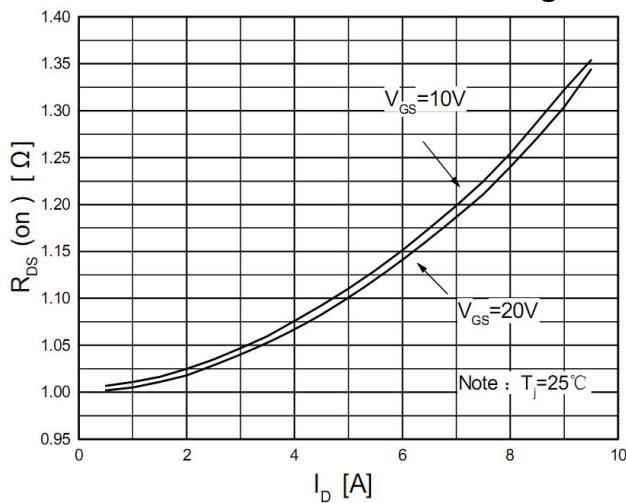
## On-Region Characteristics



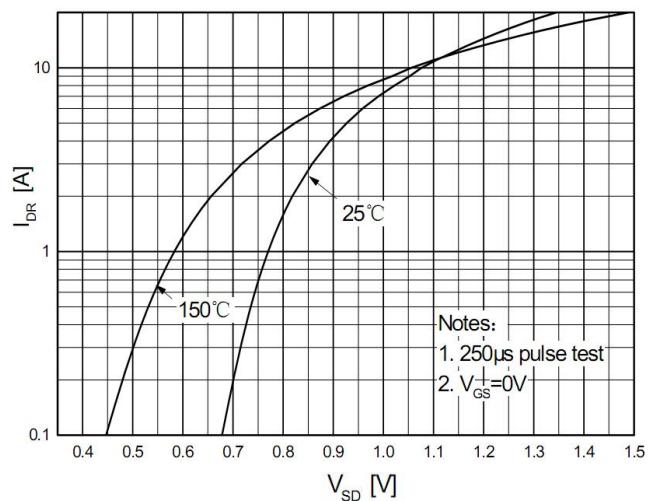
## Transfer Characteristics



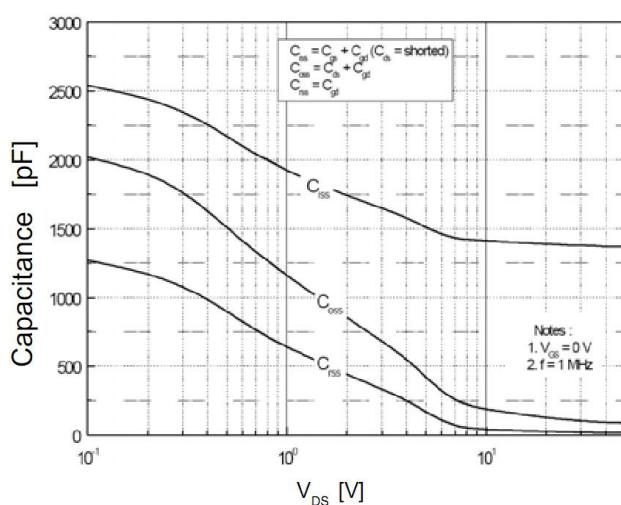
## On-Resistance Variation vs. Drain Current and Gate Voltage



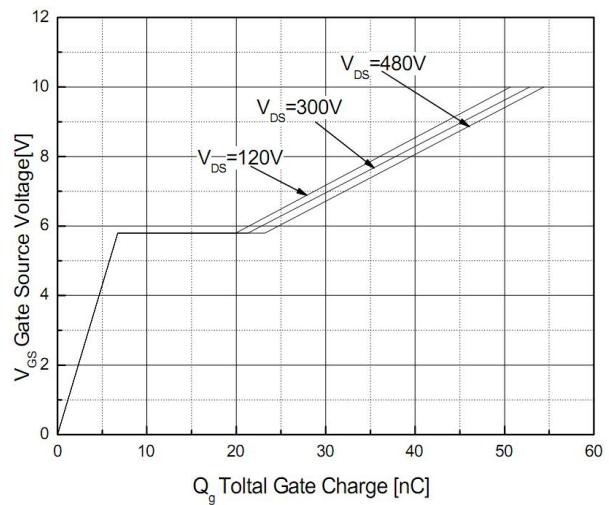
## Body Diode Forward Voltage Variation vs. Source Current and Temperature



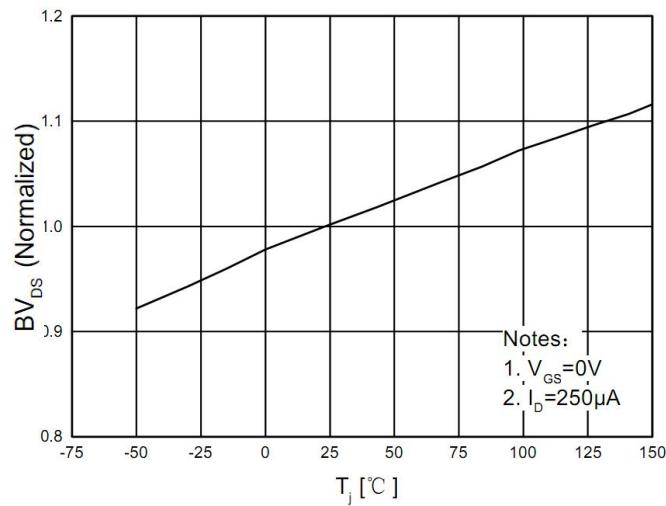
## Capacitance Characteristics



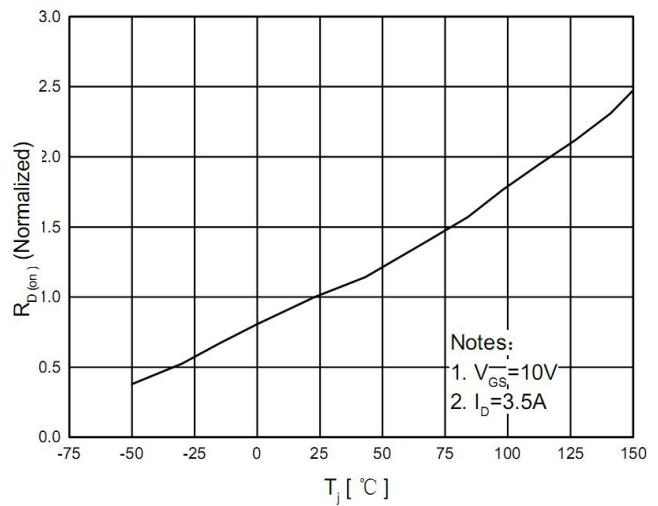
## Gate Charge Characteristics



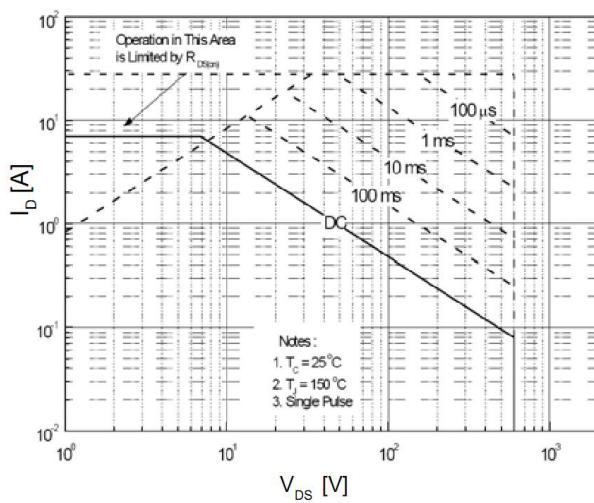
### Breakdown Voltage Variation vs. Temperature



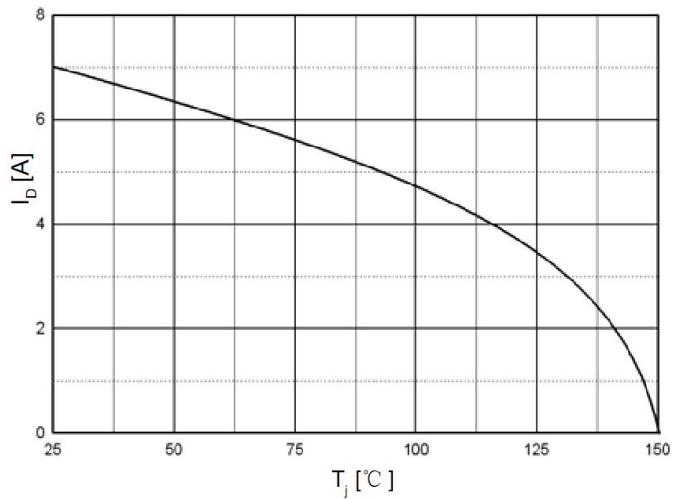
### On-Resistance Variation vs. Temperature



### Maximum Safe Operating Area



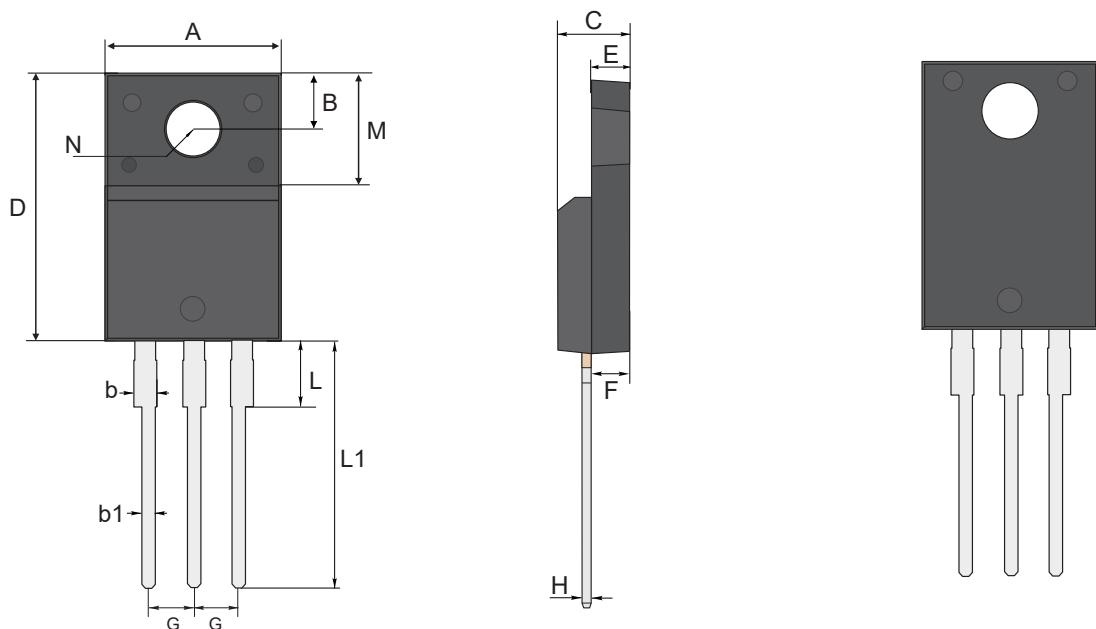
### Maximum Drain Current Vs. Case Temperature



## Package Outline

TO-220F

Dimensions in mm



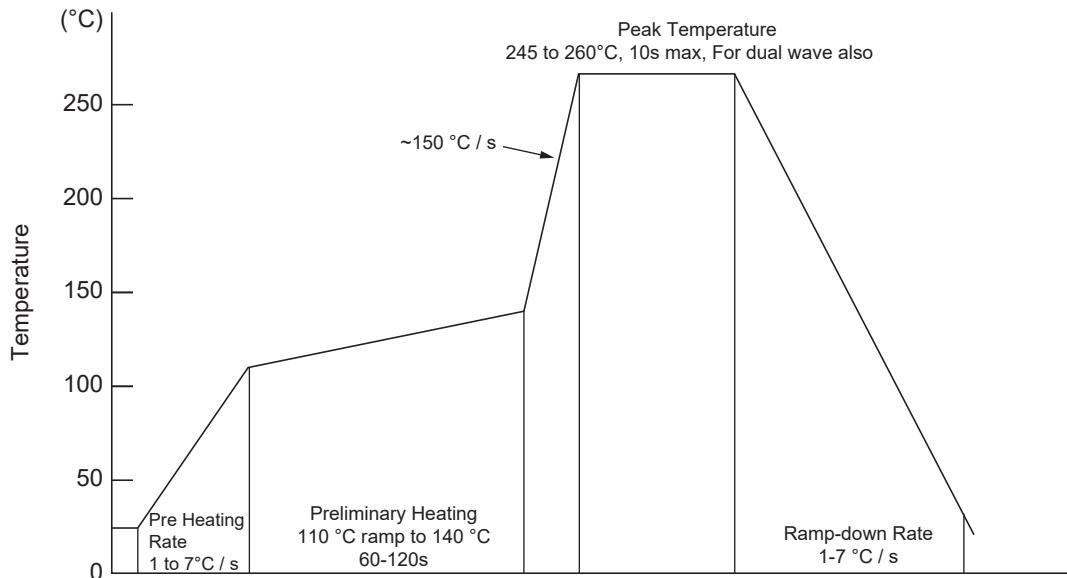
UNIT		A	B	b	b1	C	D	E	F	G	H	L	L1	M	N
mm	max	10.28	3.37	1.44	0.9	4.9	16.07	2.74	2.74	2.64	0.6	2.85	13.7	6.88	3.18 typ.
	typ	10.18	3.27	1.34	0.8	4.7	15.87	2.54	2.54	2.54	0.5	2.65	13.5	6.68	
	min	10.08	3.17	1.24	0.7	4.5	15.67	2.34	2.34	2.44	0.4	2.45	13.3	6.48	
mil	max	405	133	57	35	193	633	108	108	104	24	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
TN60H08NTF	TO-220F	50PCS/Tube

## Conditions of Soldering and Storage

### ◆ Wave Soldering



### ◆ Conditions of hand soldering

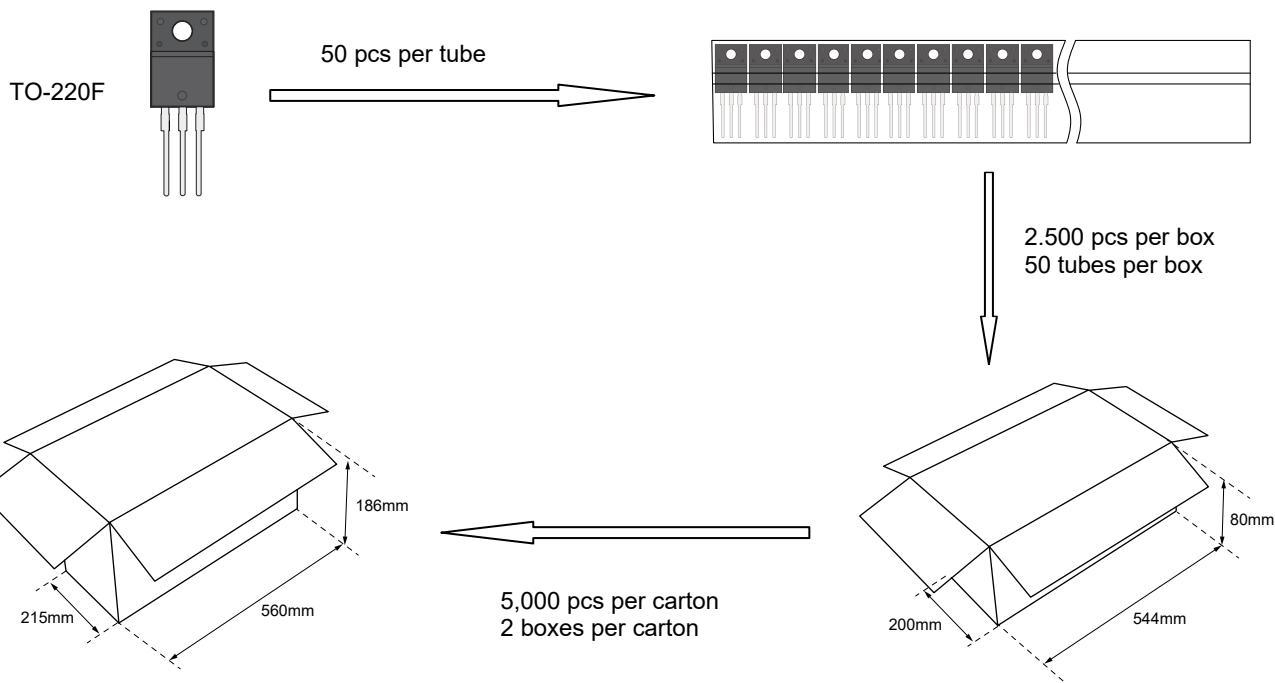
- Temperature: 360°C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

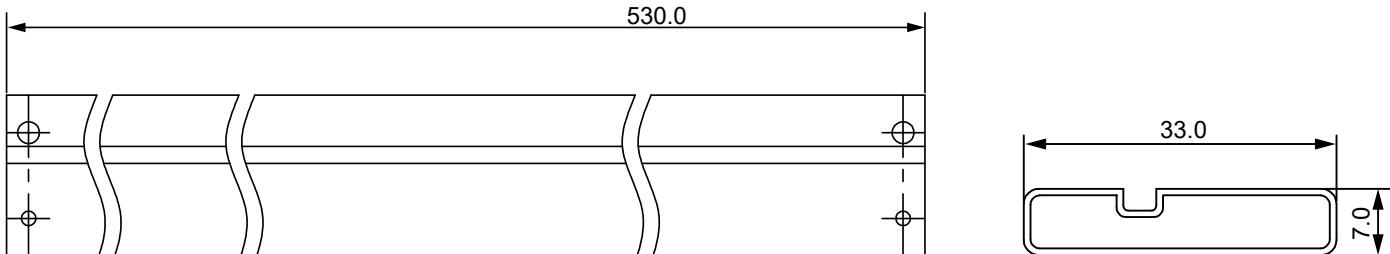
- **Temperature**  
5 to 40°C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

## 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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