



HY2N65

N-CHANNEL POWER MOSFET

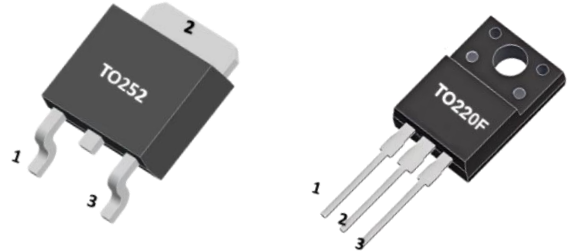
2A, 650V N-CHANNEL POWER MOSFET

DESCRIPTION

The HY2N65A is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} \leq 5.0 \Omega$ @ $V_{GS} = 10V$, $I_D = 1.0A$
- * Ultra Low gate charge (typical 45nC)
- * Low reverse transfer capacitance ($CR_{SS} =$ typical 9 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness



MARKING



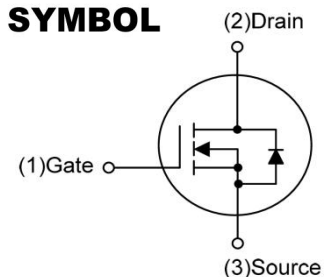
: HY LOGO

HY2N65A=Device Code

XXXX=Date Code

Solid Dot=Green molding compound

SYMBOL



ABSOLUTE MAXIMUM RATINGS(TA=25°C, unless otherwise specified.)

SYMBOL	PARAMETER		VALUE	UNIT
V _{DS}	Drain-Source Voltage		650	V
V _{GS}	Gate Source Voltage		±30	V
I _{AR}	Avalanche Current (Note 2)		2.0	A
I _D	Continuous Drain Current		2.0	A
I _{DM}	Pulsed Drain Current (Note 2)		8.0	A
E _{AS}	Avalanche Energy	Single Pulsed (Note 3)	140	mJ
E _{AR}		Repetitive (Note 2)	4.5	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 4)		4.5	V/ns
P _D	Power Dissipation	TO-220F	21	W
		TO-252	28	W
T _J	Junction Temperature		150	°C
T _{STG}	Storage Temperature		-55 to 150	°C
T _{OPR}	Operating Temperature		-55 to 150	°C

Notes: 1.Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.



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2. Repetitive Rating : Pulse width limited by T_J.
3. L=64mH, I_{AS}=2.0A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD}≤2.4A, di/dt≤200A/μs, V_{DD} ≤ B_VD_{SS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	θ _{JA}	62.5	°C/W
	TO-252		110	
Junction to Case	TO-220F	θ _{JC}	5.95	°C/W
	TO-252		4.53	

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	V _(BR) DSS	V _{GS} =0V, I _D =250μA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔV _(BR) DSS/ΔT _J	I _D =250μA, Referenced to 25°C		0.4		V/°C
ON CHARACTERISTICS						
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =1.0A		3.9	5.0	Ω
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} ,I _D =250μA	2.4		4.0	V
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V,V _{DS} =25V f=1.0MHz		320	370	pF
Output Capacitance	C _{OSS}			40	50	
Reverse Transfer Capacitance	C _{RSS}			9	12	
SWITCHING CHARACTERISTICS						
Total gate charge	Q _g	V _{DS} =520V,V _{GS} =10V,I _D =2.4A (Note 1, 2)		45	55	nC
Gate-source charge	Q _{gs}			4		
Gate-drain charge	Q _{gd}			8.4		
Turn-On Delay Time	t _{d(on)}	V _{DD} =325V,I _D =2.4A R _G =25Ω (Note 1, 2)		35	50	nS
Turn-On Rise time	t _r			40	60	
Turn-Off Delay Time	t _{d(off)}			130	160	
Turn-Off Fall time	t _f			40	60	



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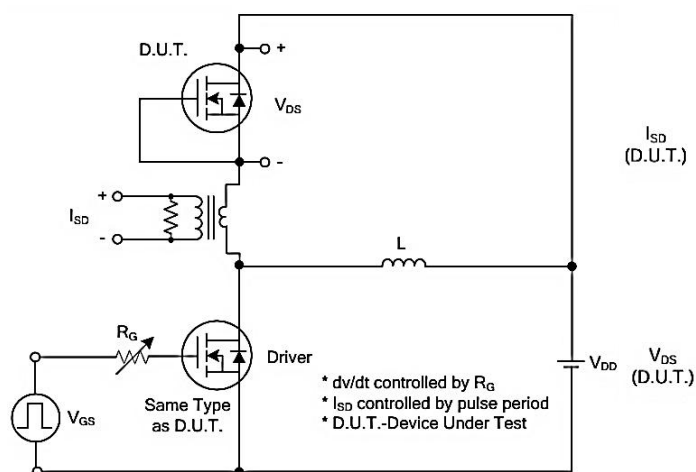
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain-Source Diode Forward Voltage	VSD	$V_{GS} = 0\text{ V}, I_S = 2.0\text{ A}$			1.4	V
Continuous Drain-Source Current	I_S				2.0	A
Pulsed drain-source diode forward current	I_{SM}				8.0	A
Reverse Recovery Time	t_{rr}	$I_S = 2.4\text{ A}, V_{GS} = 0\text{ V}$		180		ns
Reverse Recovery Charge	Q_{rr}	$dI/dt = 100\text{ A}/\mu\text{s}$ (Note 1)		0.72		μC

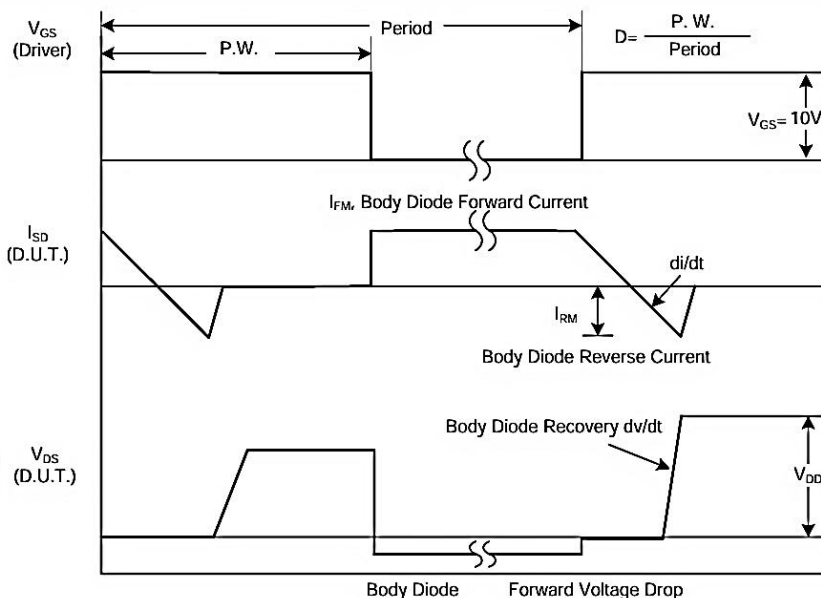
Notes:

1. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit



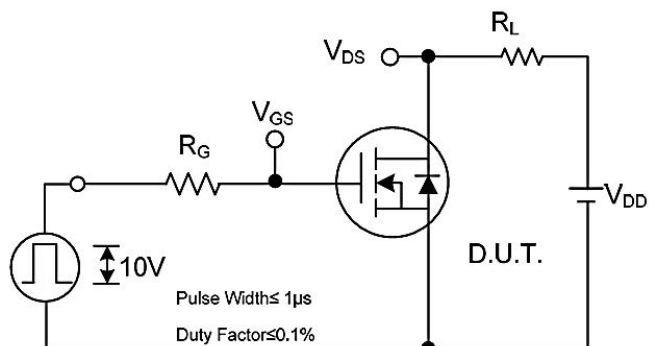
Peak Diode Recovery dv/dt Waveforms



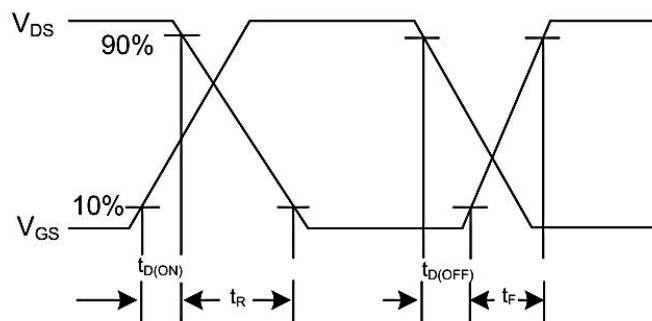
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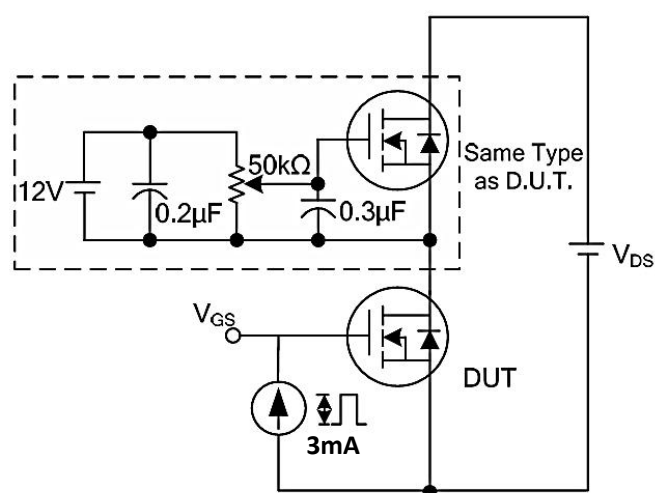
■ TEST CIRCUITS AND WAVEFORMS(Con.t)



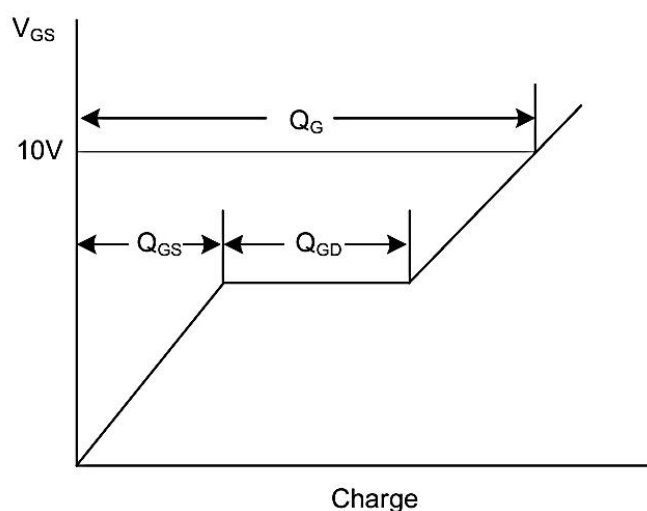
Switching Test Circuit



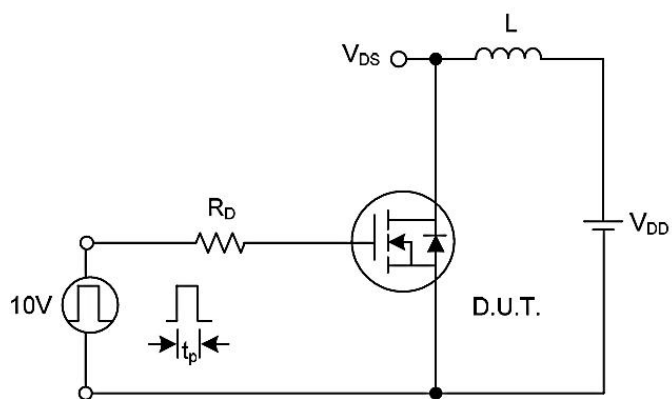
Switching Waveforms



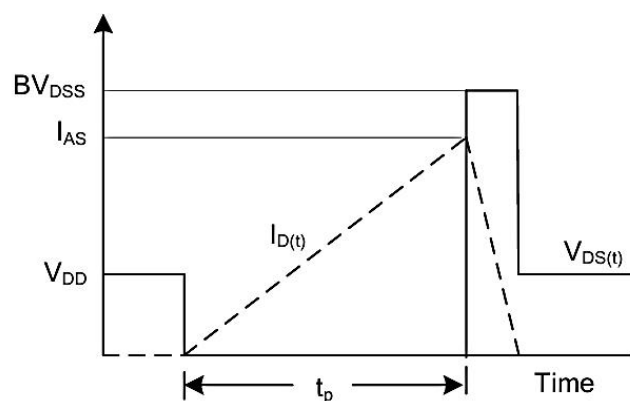
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



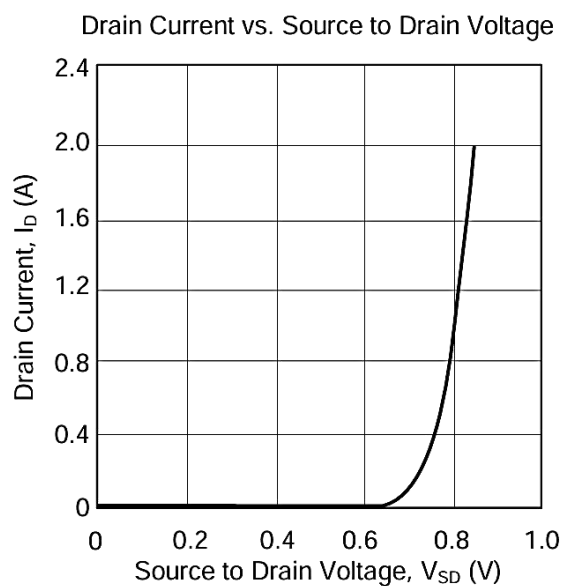
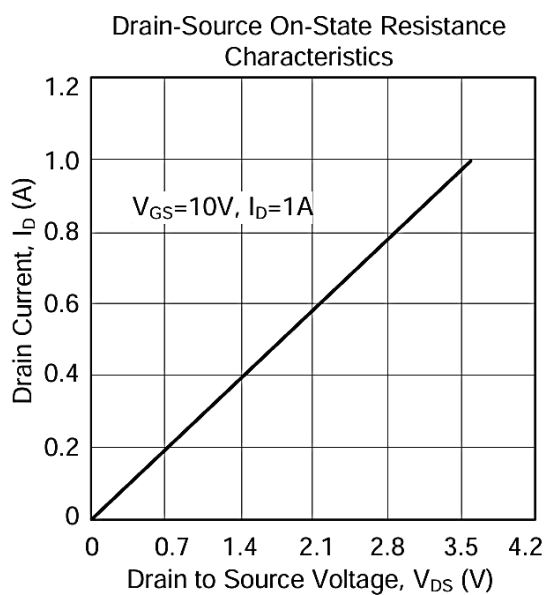
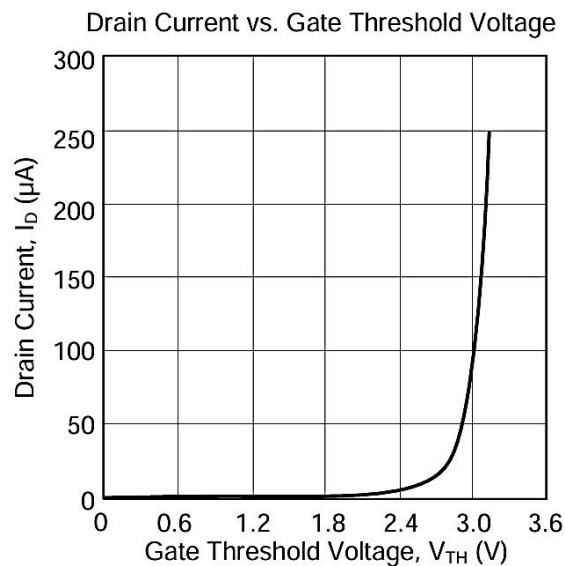
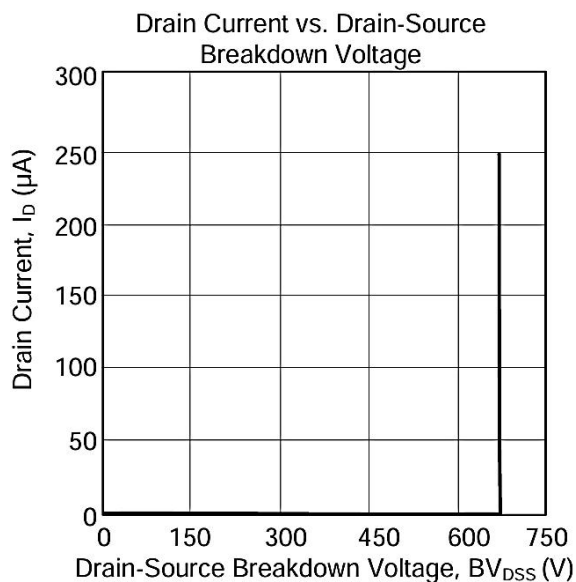
Unclamped Inductive Switching Waveforms



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■ TYPICAL CHARACTERISTICS

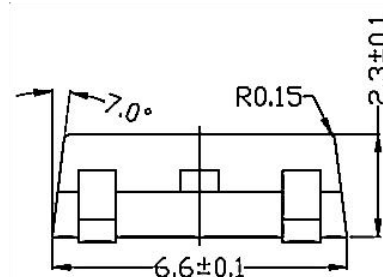
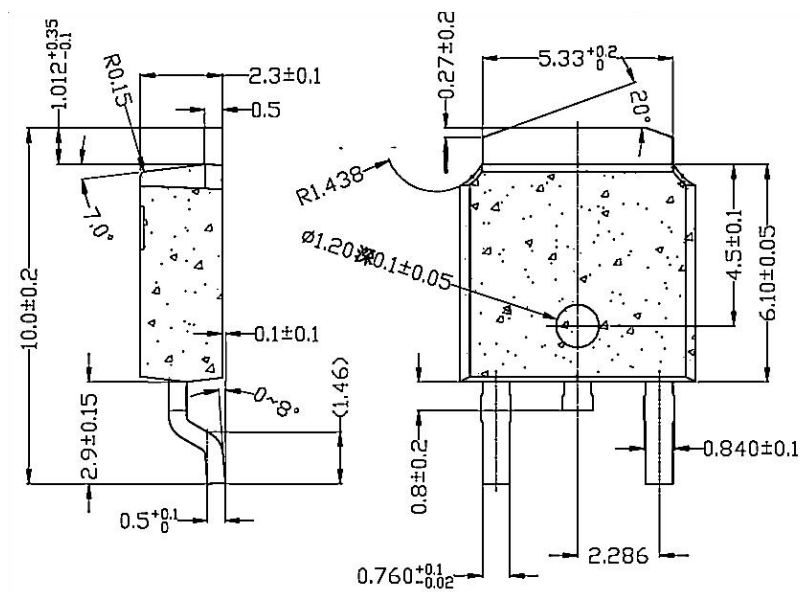




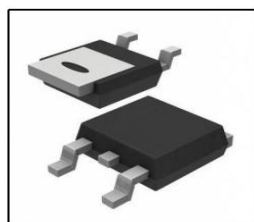
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TO - 252 PACKAGE OUTLINE DIMENSIONS



TO - 252 PACKING INFORMATION



2500PC
S/reel



2 Reel/BOX



Outer box

5 Inner
Box



Inner box

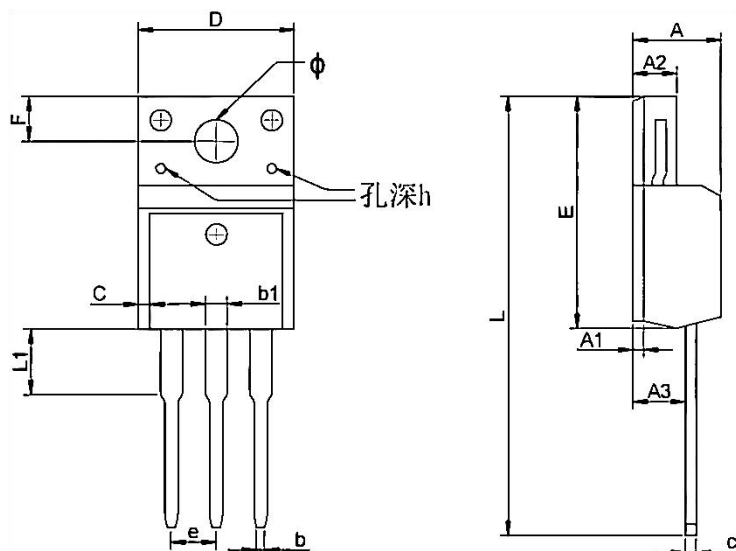
Package version	Reel dimensions $\Phi \times H$ (mm)	Per Reel (pcs)	Reels per box	Inner box dimensions $L \times W \times H$ (mm)	Outer box (pcs)	Outer box dimensions $L \times W \times H$ (mm)
TO-252	$\Phi 330 \times 20$	2500	2	360*340*50	25000	375*375*280



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TO-220F PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max	Min	Max
A	4.300	4.750	0.169	0.185
A1	1.830 REF		0.072 REF	
A2	2.300	2.850	0.090	0.112
A3	2.500	2.900	0.098	0.114
b	0.400	0.420	0.016	0.016
b1	1.220	1.280	0.048	0.050
C	0.690	0.720	0.027	0.028
c	0.490	0.510	0.019	0.020
D	9.960	10.200	0.392	0.400
E	15.000	15.950	0.588	0.625
e	2.574 TYP		0.101TYP	
F	3.470 REF		0.136 REF	
y	3.200 REF		0.125 REF	
h	0.000	0.300	0.000	0.012
L	28.780	28.900	1.128	1.133
L1	2.990	3.100	0.117	0.122

TO - 220F PACKING INFORMATION



50PCS

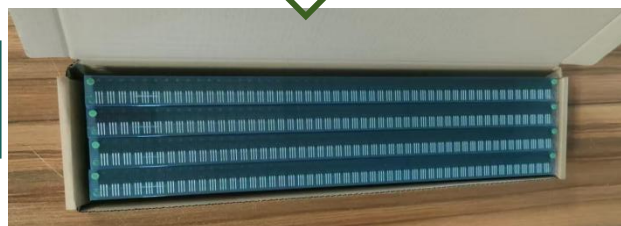


20 Tube



Outer Box

5 Inner
Box



Inner Box

Package version	Tube dimensions LxW×H (mm)	Per Tube (pcs)	Tube per box	Inner box dimensions LxW×H (mm)	PCS/ Inner box	Outer box dimensions L×W×H(mm)	PCS/ Outer box
TO-220F	530*32*7	50	20	580*155*50	1000	602*277*188	5000