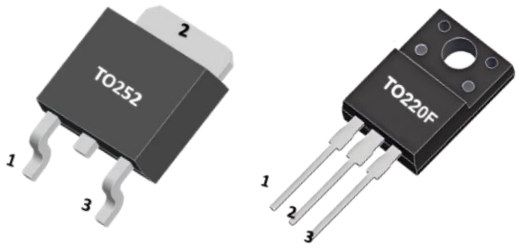
20A, 60V N-CHANNEL ENHANCEMENT MODE POWER MOSFET

■ DESCRIPTION

The HY20N06A is an N-channel enhancement mode power MOSFET using our advanced technology to provide customers with a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode. The HY20N06 is universally applied in low voltage, such as automotive, high efficiency switching for DC/DC converters and DC motor control.

The HY20N06A meet the ROHS and Green Product requirement with full function reliabilit y approved.



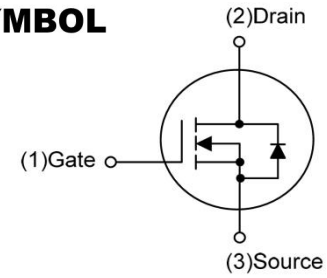
■ FEATURE

* Excellent package for good heat dissipation.
* Ultra low gate charge.
* Low reverse transfer capacitance.
* Fast switching capability.
* Avalanche energy specified.

■ MARKING

: HY LOGO
HY20N06A=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_{DSS}	Drain-Source Voltage		60	V
V_{GSS}	Gate Source Voltage		±20	V
I_D	Continuous Drain Current (Note 1)		20	A
I_{DM}	Pulsed Drain Current (Note 2)		80	A
E_{AS}	Single Pulsed Avalanche Energy (Note 3)		49	mJ
P_D	Maximum Power Dissipation (Note 1)	TO-220F	30	W
		TO-252	40	
T_J	Storage Temperature		150	°C
T_{STG}	Thermal Resistance Fr .0om Junction To Ambient		-55~150	°C
$R_{\theta JA}$	Thermal Resistance fromJunction to Ambient (Note 6)	TO-220F	62.5	°C/W
		TO-252	100	
$R_{\theta JC}$	Thermal Resistance From Junction To Case (Note 1)	TO-220F	5	°C/W
		TO-252	3.12	

Notes: 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.

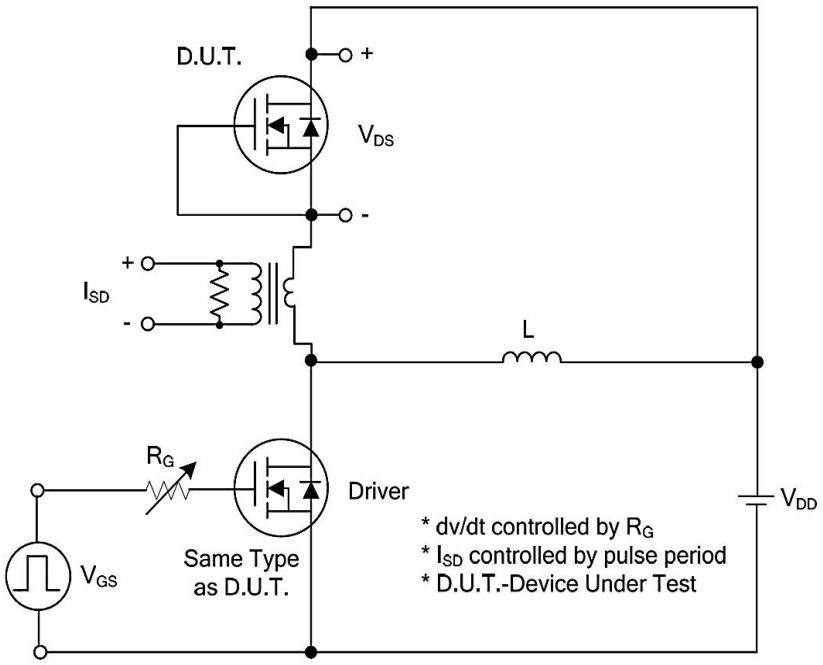
■ ELECTRICAL CHARACTERISTICS (TA=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	60			V
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V,V_{GS}=0V			1	μA
		V_{DS}=48V,V_{GS}=0V,T_J=125°C			10	μA
Gate-body leakage current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
ON CHARACTERISTICS (Note 4)						
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A		26	35	mΩ
		V_{GS}=4.5V, I_D=10A		35	50	
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS},I_D=250μA	1.0	1.7	2.5	V
DYNAMIC PARAMETERS (Note 4,5)						
Input Capacitance	C_{ISS}	V_{GS}=0V,V_{DS}=25V f=1.0MHz		850	1700	pF
Output Capacitance	C_{OSS}			60	120	
Reverse Transfer Capacitance	C_{RSS}			55	110	
Gate resistance	Rg	f =1MHz		2.0		Ω
SWITCHING PARAMETERS(Note 4,5)						
Total gate charge	Qg	V_{DS}=30V,V_{GS}=10V I_D=10A		18	36	nC
Gate-source charge	Qgs			2.0	4	
Gate-drain charge	Qgd			4.4	8.8	
Turn-On Delay Time	td(on)	V_{DS}=30V,R_L=2.5Ω V_{GS}=10V, R_G=3Ω		4.2		nS
Turn-On Rise time	tr			3.4		
Turn-Off Delay Time	td(off)			16		
Turn-Off Fall time	tf			2		
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Continuous drain-source diode forward current(Note1)	I_S				20	A
Pulsed drain-source diode forward current(Note 2)	I_{SM}				80	A
Drain-source diode forward voltage(Note 4)	VSD	I_S=10A,V_{GS}=0V			1.2	V

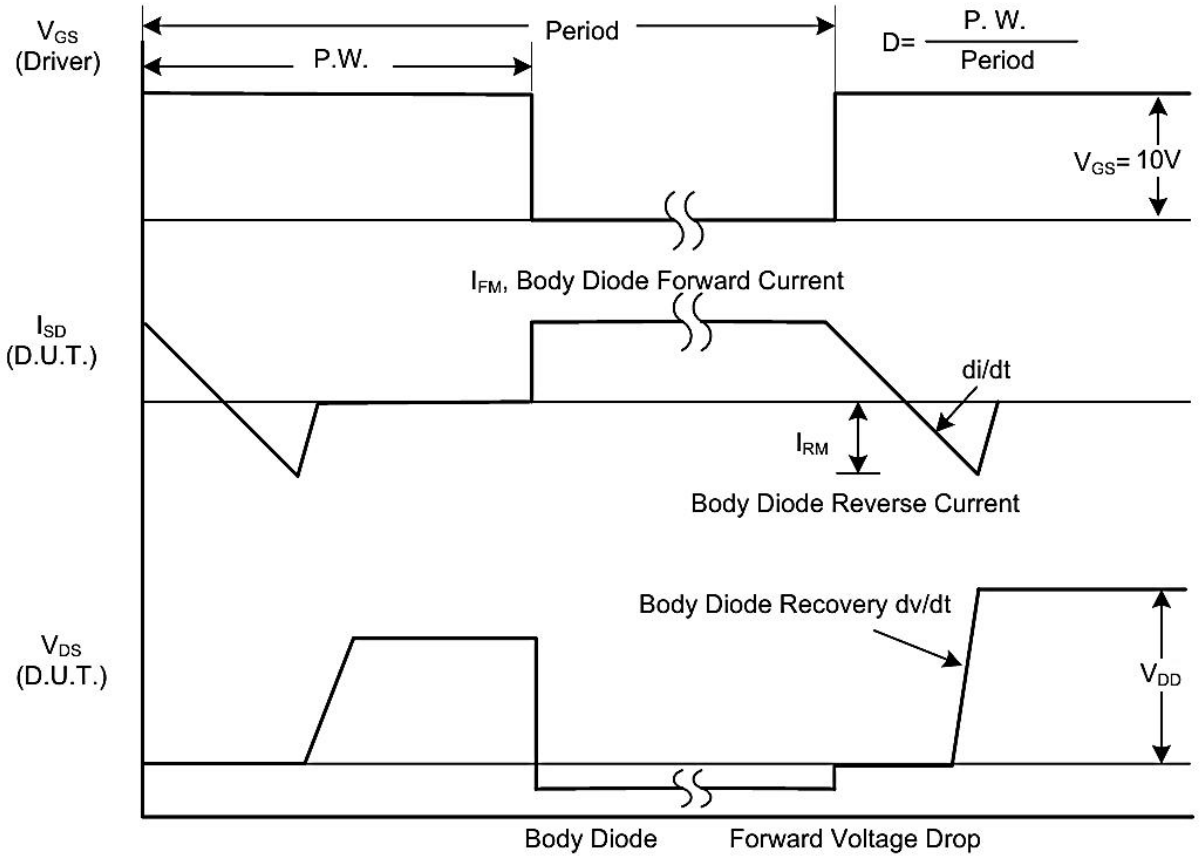
Notes:

1. T_C=25℃ Limited only by maximum temperature allowed.
2. PW≤10μs, Duty cycle≤1%.
3. EAS condition: V_{DD}=30V,V_{GS}=10V, L=0.5mH, Rg=25Ω Starting T_J = 25°℃.
4. Pulse Test : Pulse Width≤300μs, duty cycle ≤2%.
5. Guaranteed by design, not subject to production.
6. The value of RθJA is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with Ta=25℃.

■ TEST CIRCUITS AND WAVEFORMS(1)

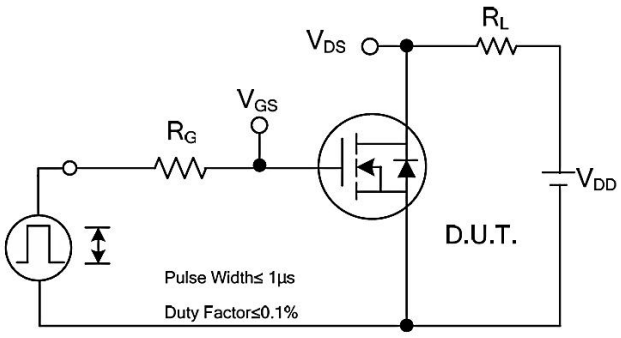


Peak Diode Recovery dv/dt Test Circuit

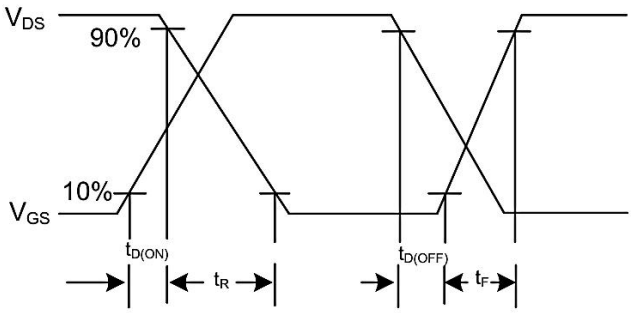


Peak Diode Recovery dv/dt Waveforms

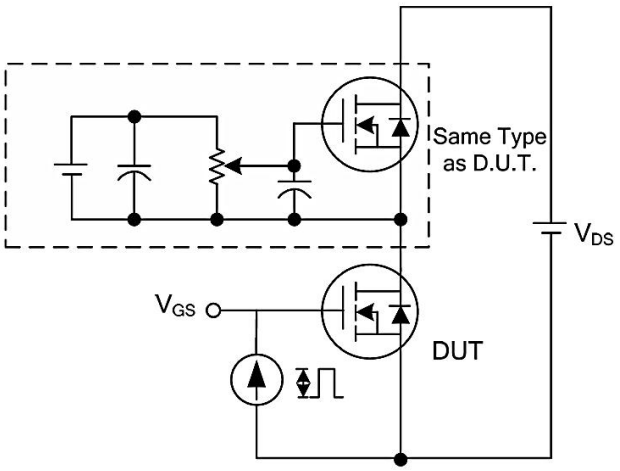
■ TEST CIRCUITS AND WAVEFORMS(2)



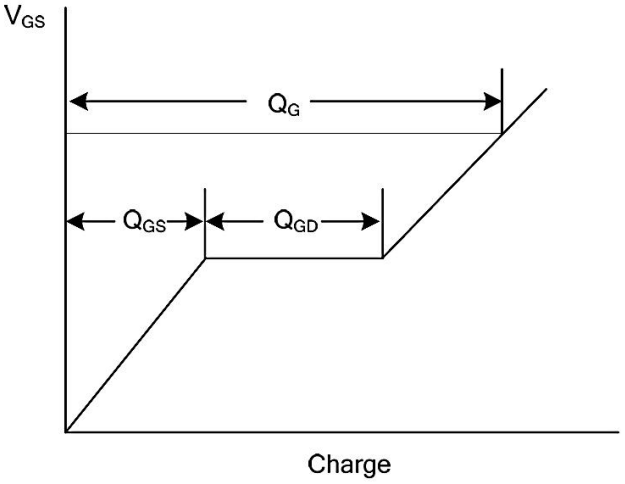
Switching Test Circuit



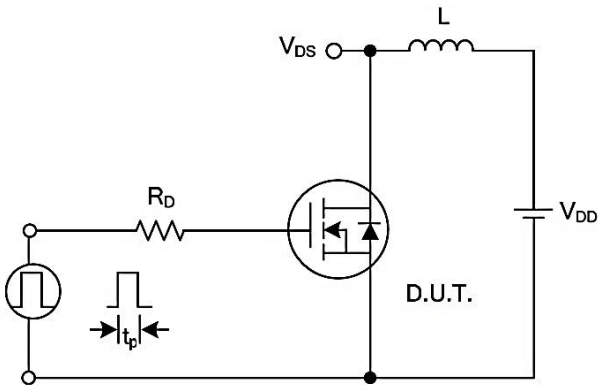
Switching Waveforms



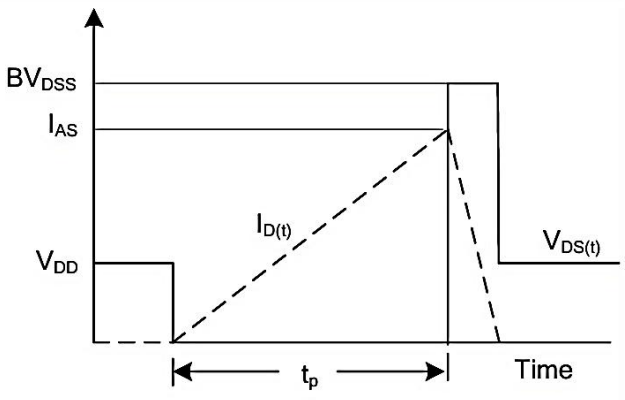
Gate Charge Test Circuit



Gate Charge Waveform



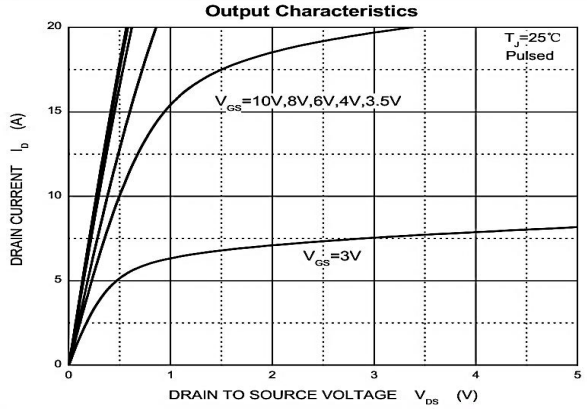
Unclamped Inductive Switching Test Circuit



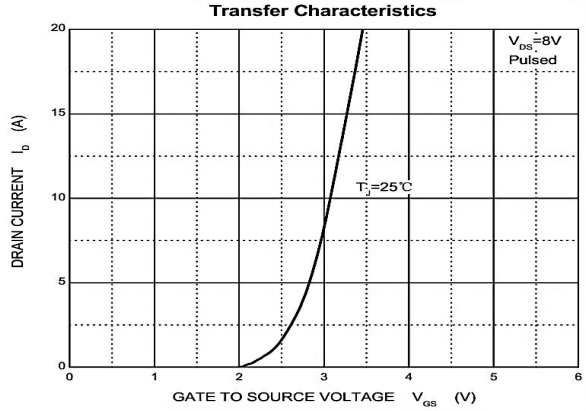
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

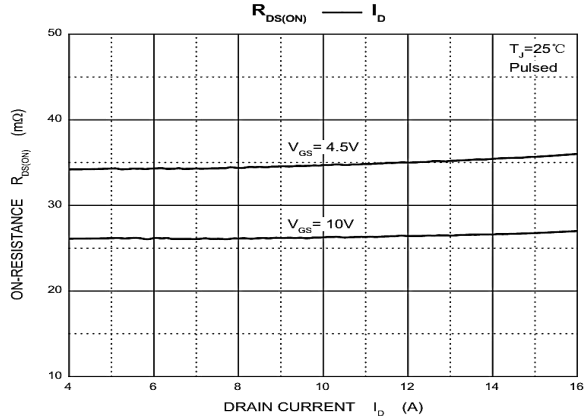
Output Characteristics



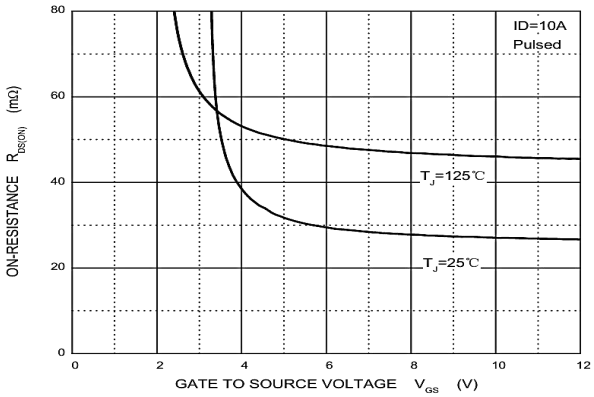
Transfer Characteristics



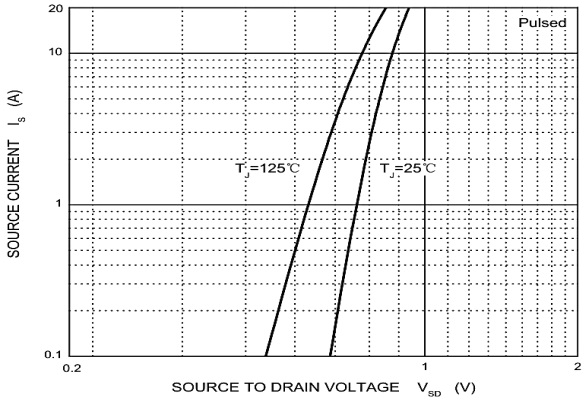
$R_{DS(ON)}$ —— I_D



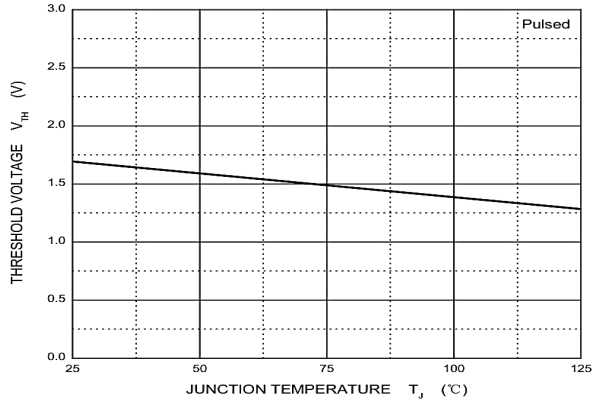
$R_{DS(ON)}$ —— V_{GS}



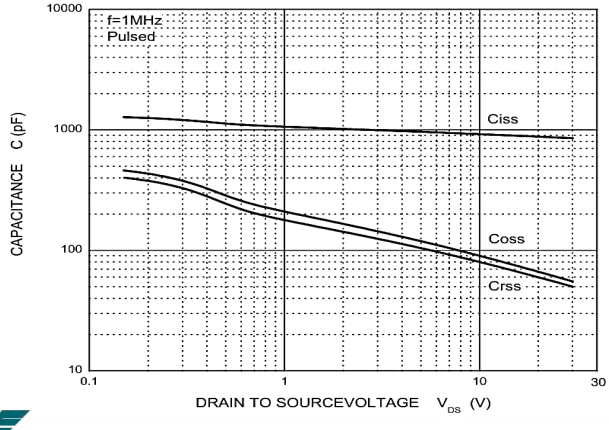
I_S —— V_{SD}



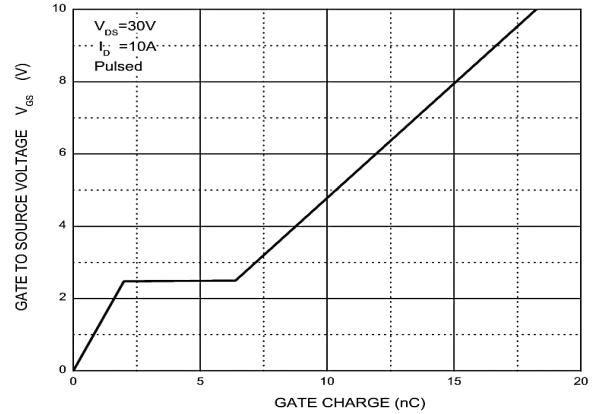
Threshold Voltage



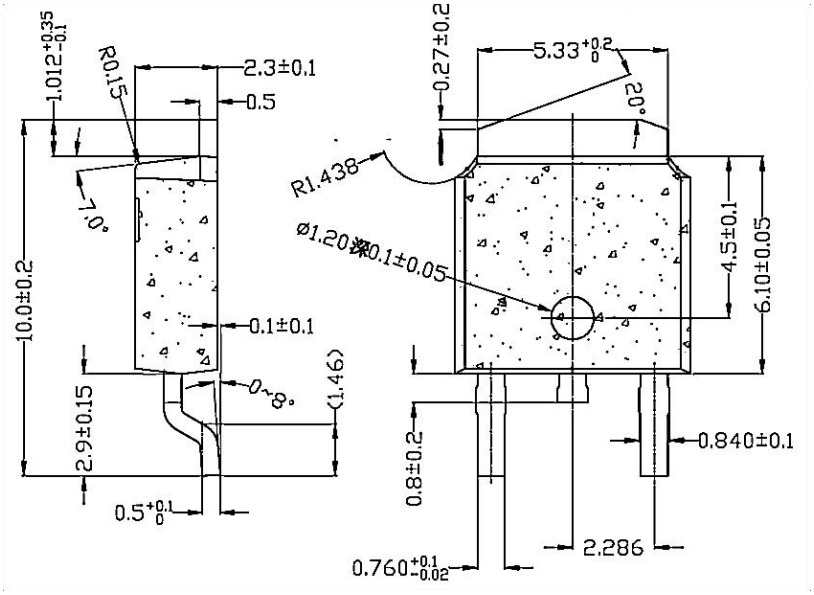
Capacitances

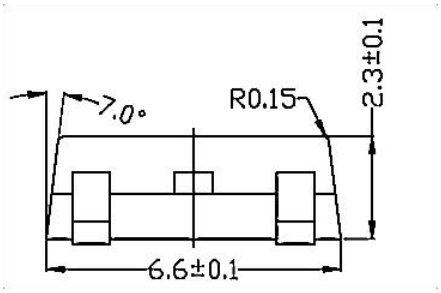


Gate Charge

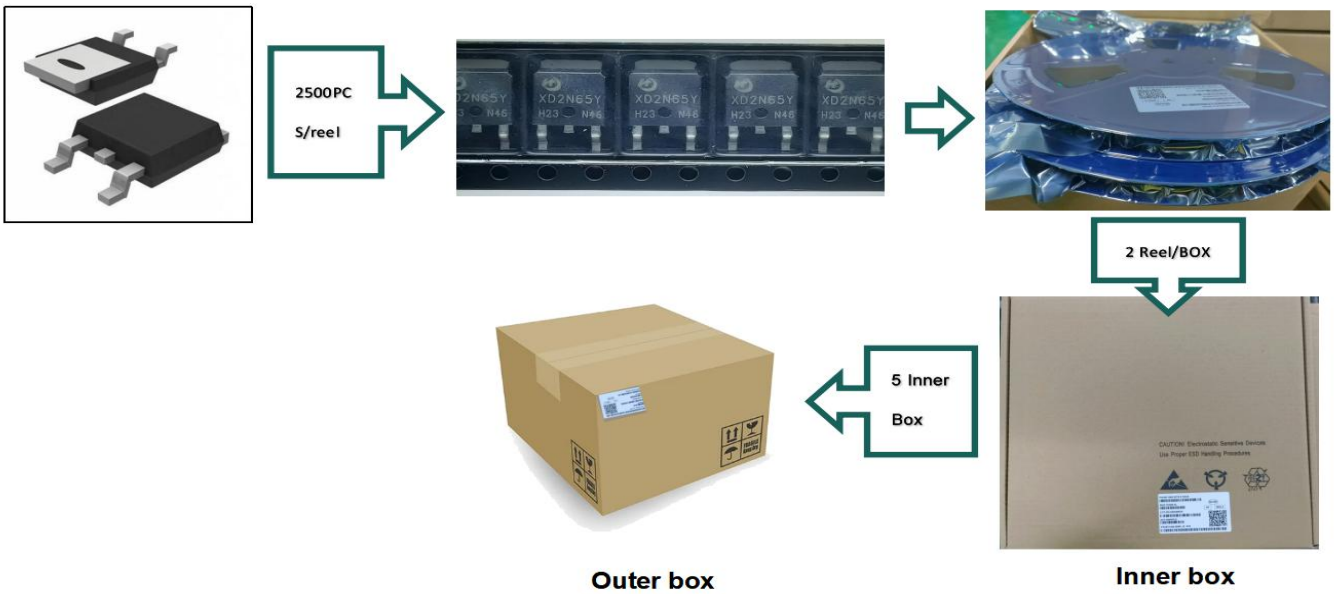


■ TO - 252 PACKAGE OUTLINE DIMENSIONS



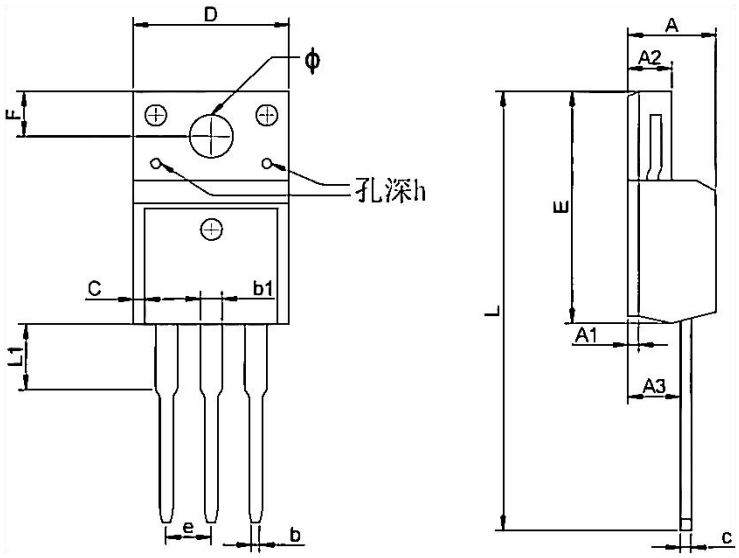


■ TO - 252 PACKING INFORMATION



Package version	Reel dimensions Φ×H (mm)	Per Reel (pcs)	Reels per box	Inner box dimensions L×W×H(mm)	Outer box (pcs)	Outer box dimensions L×W×H (mm)
TO-252	Φ330*20	2500	2	360*340*50	25000	375*375*280

■ 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

5 Inner Box

Outer 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