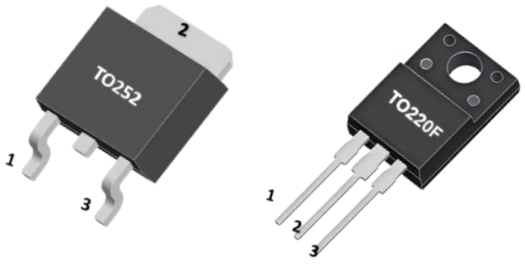
30A, 100V N-CHANNEL ENHANCEMENT MODE POWER MOSFET

■ DESCRIPTION

The HY30N10A is a N-channel mode power MOSFET using our advanced technology to provide customers with a minimum on-state resistance, low gate charge and high switching speed. The HY30N10A is suitable for high voltage synchronous rectifier and DC/DC converters, etc.

The HY30N10A meet the ROHS and Green Product requirement with full function reliability approved.



■ FEATURE

* High density cell design for ultra low $R_{DS(on)}$
* Fully characterized avalanche voltage and current
* Good stability and uniformity with high EAS
* Special process technology for high ESD capability
* Excellent package for good heat dissipation

■ MARKING

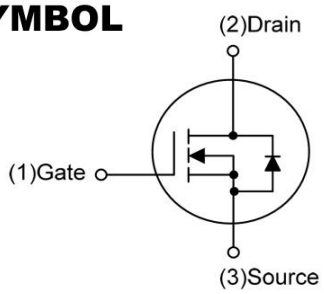
: HY LOGO

HY30N10A=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		100	V
V_{GSS}	Gate Source Voltage		±20	V
I_D	Continuous Drain Current (VGS=10V) TC=25°C		30	A
I_{DM}	Pulsed Drain Current		60	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		28	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 4)		3.2	V/ns
P_D	Power Dissipation	TO-220F	28	W
		TO-252	44	
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	TO-220F	62.5	°C/W
		TO-252	110	
$R_{\theta JC}$	Thermal Resistance From Junction To Case (Note 5)	TO-220F	4.46	°C/W
		TO-252	2.85	

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.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. L=1mH, I_{AS}=7.5A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C

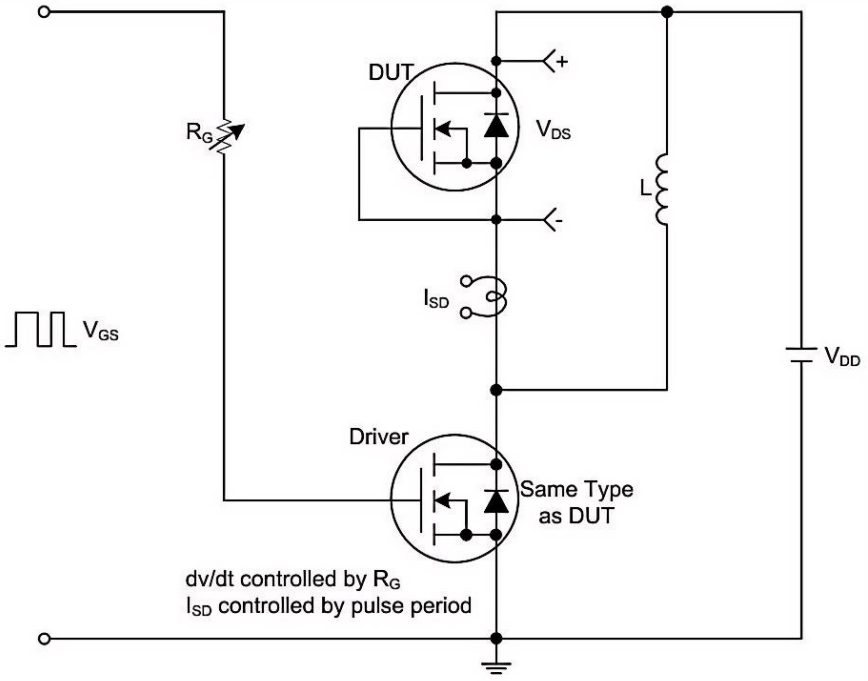
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

5.Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

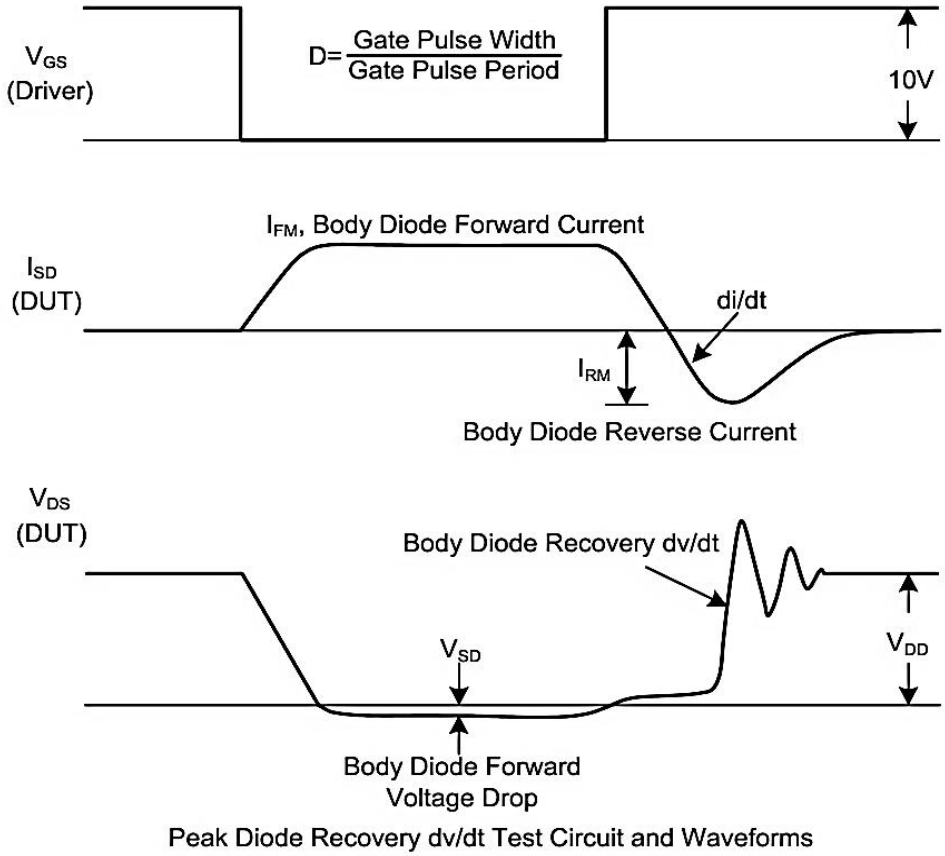
■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	$V_{(BR)\ DSS}$	V_{GS}=0V, I_D=250μA	100			V
Zero gate voltage drain current	I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
ON CHARACTERISTICS						
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=30A			40	mΩ
		V_{GS}=4.5V, I_D=15A			52	mΩ
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS},I_D=250μA	1.0		3.0	V
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V,V_{DS}=25V f=1.0MHz		1950		pF
Output Capacitance	C_{OSS}			130		
Reverse Transfer Capacitance	C_{RSS}			108		
SWITCHING PARAMETERS						
Total gate charge	Qg	V_{DS}=80V,V_{GS}=10V I_D=30A		75		nC
Gate-source charge	Qgs			10.5		
Gate-drain charge	Qgd			20		
Turn-On Delay Time	td(on)	V_{DD}=50V,I_D=30A V_{GS}=10V, R_G=3.3Ω		9		nS
Turn-On Rise time	tr			18		
Turn-Off Delay Time	td(off)			40		
Turn-Off Fall time	tf			20		
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Continuous drain-source diode forward current	I_S				30	A
Pulsed drain-source diode forward current	I_{SM}				60	A
Drain-Source Diode Forward Voltage	V_{SD}	I_S=30A,V_{GS}=0V			1.25	V
Body Diode Reverse Recovery Time	trr	I_S =30A, V_{GS}=0V dI$_F$/dt=100A/μs		45		ns
Body Diode Reverse Recovery Charge	Qrr			44		μC

■ TEST CIRCUITS AND WAVEFORMS(1)



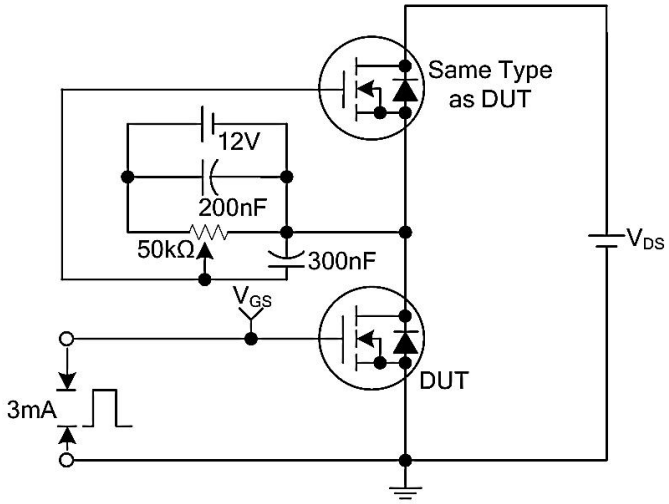
Peak Diode Recovery dv/dt Test Circuit



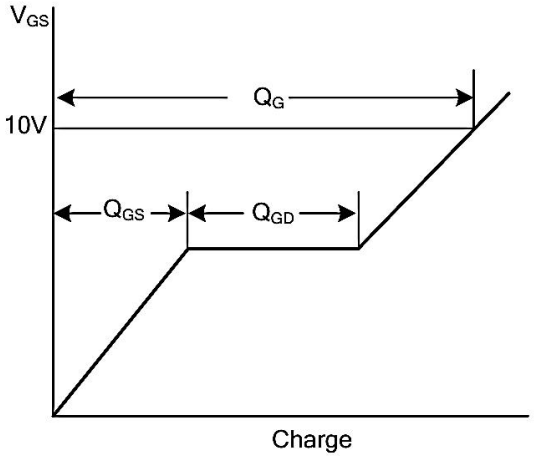
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

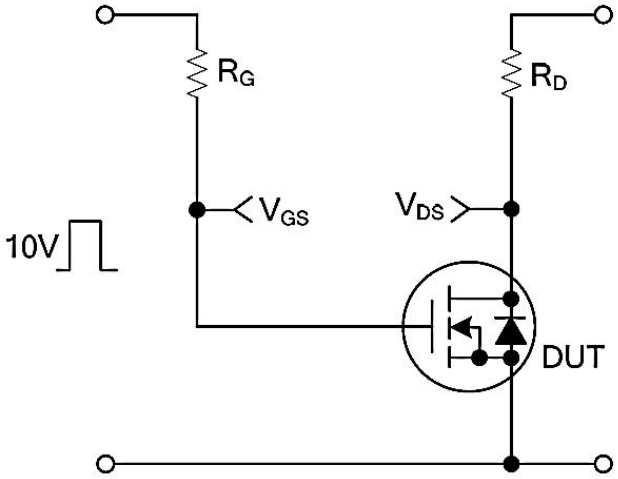
■ TEST CIRCUITS AND WAVEFORMS(2)



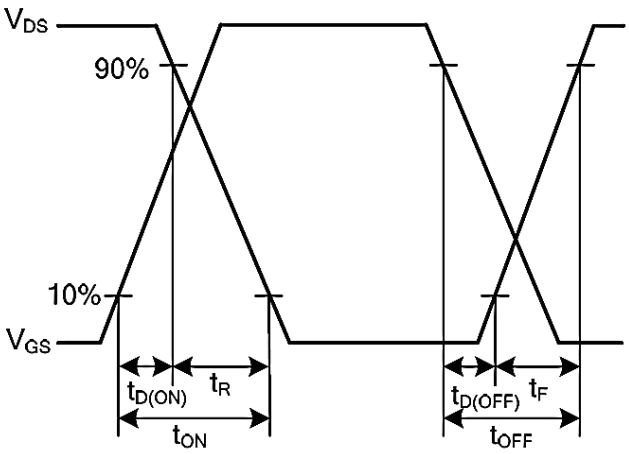
Gate Charge Test Circuit



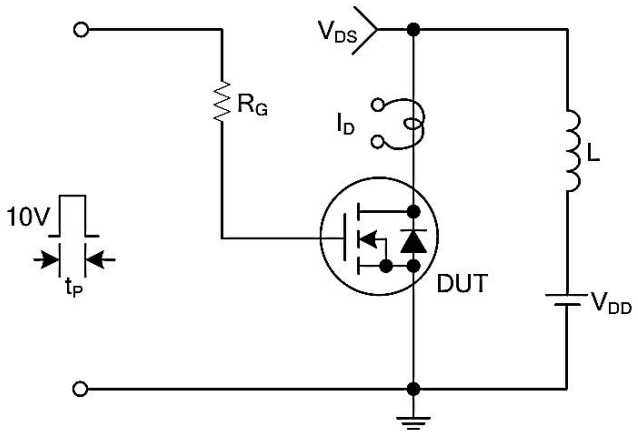
Gate Charge Waveforms



Resistive Switching Test Circuit

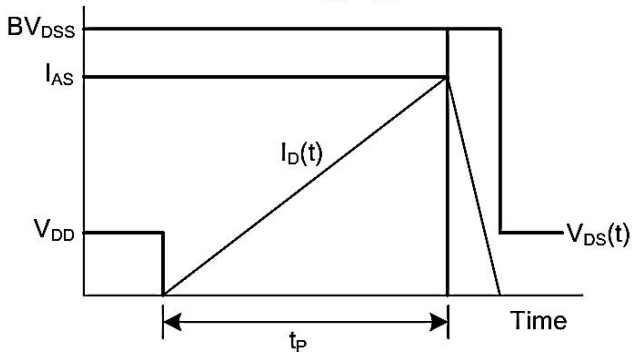


Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

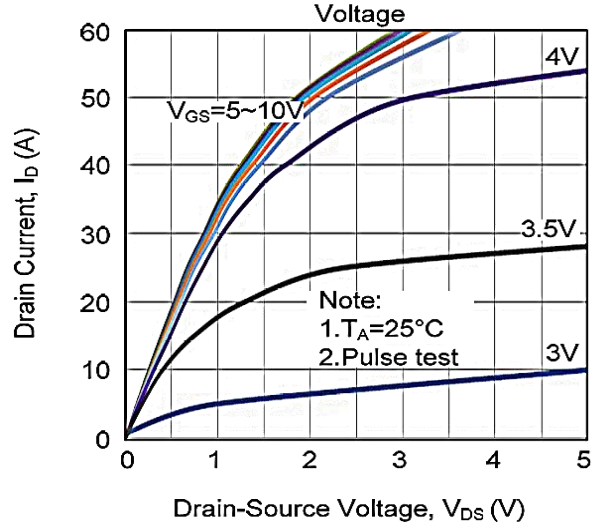
$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$



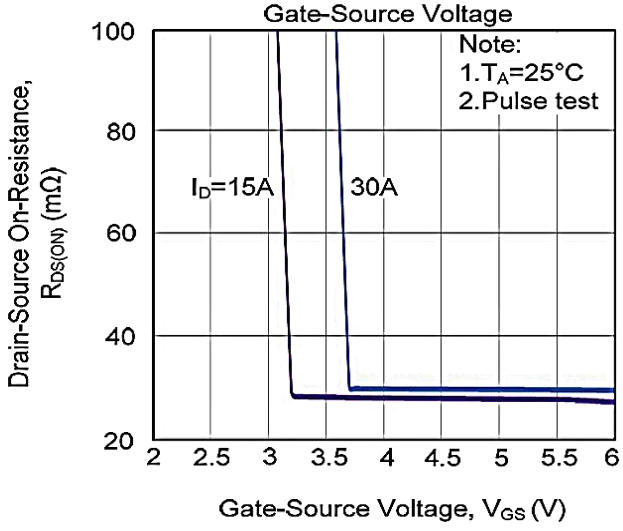
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

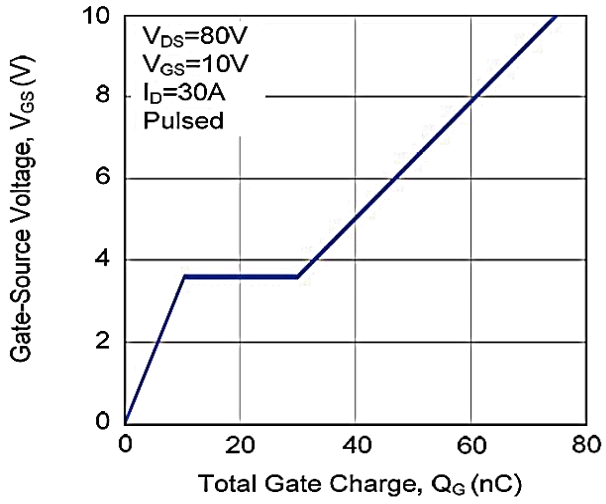
Drain Current vs. Drain-Source Voltage



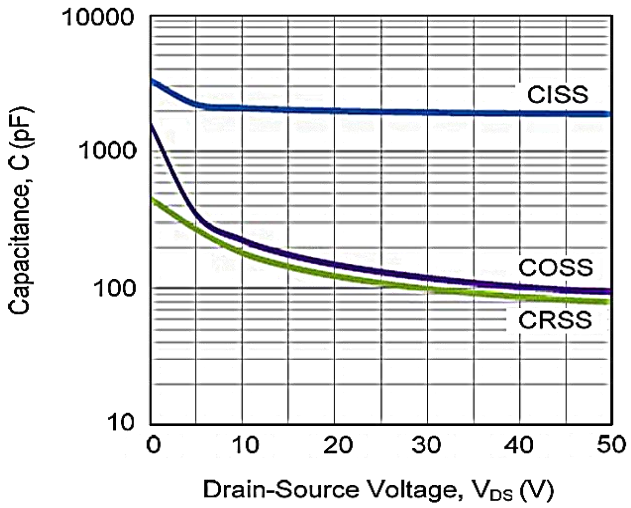
Drain-Source On-Resistance vs. Gate-Source Voltage



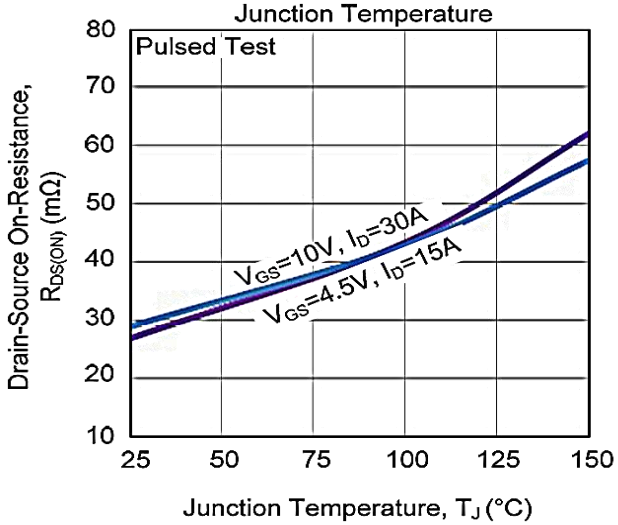
Gate Charge Characteristics



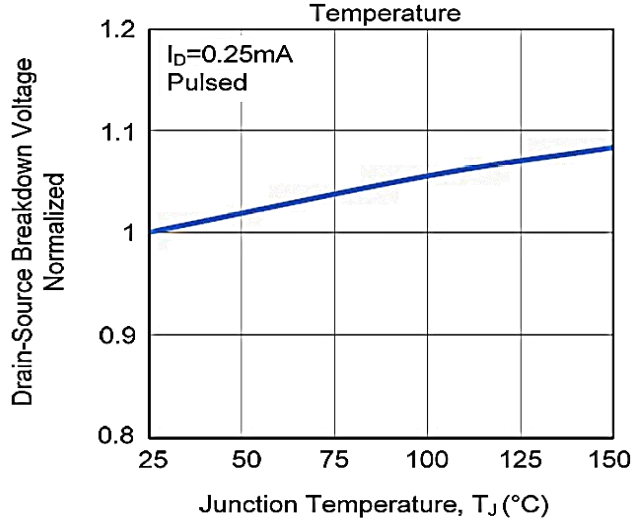
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

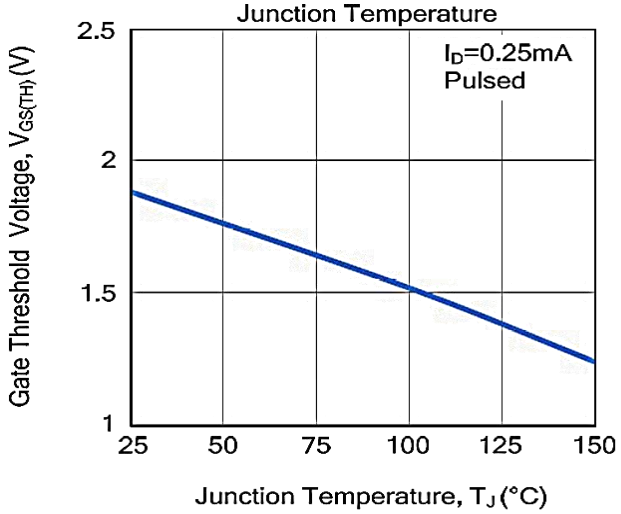


Breakdown Voltage vs. Junction Temperature

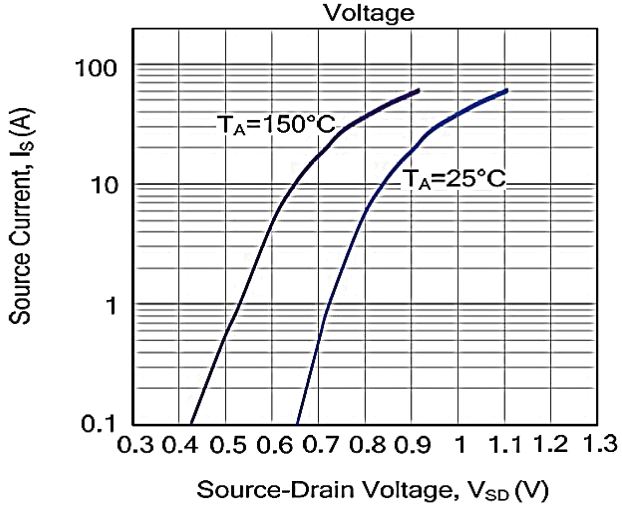


■ TYPICAL CHARACTERISTICS(Con.t)

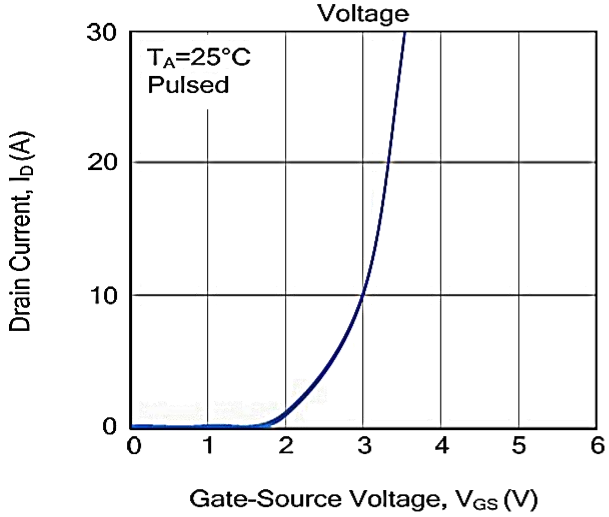
Gate Threshold Voltage vs. Junction Temperature



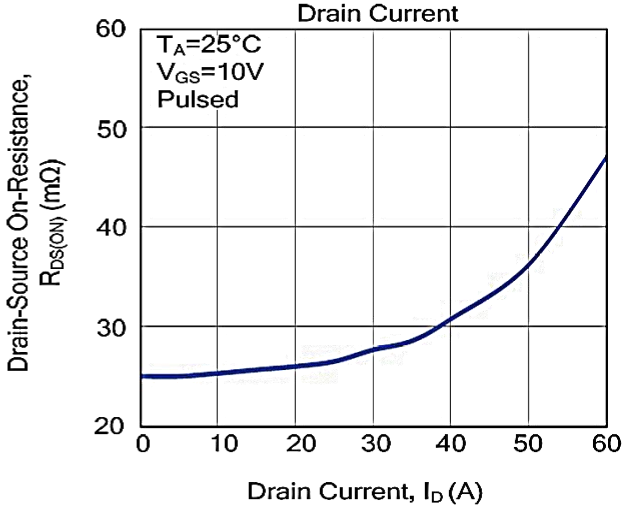
Source Current vs. Source-Drain Voltage



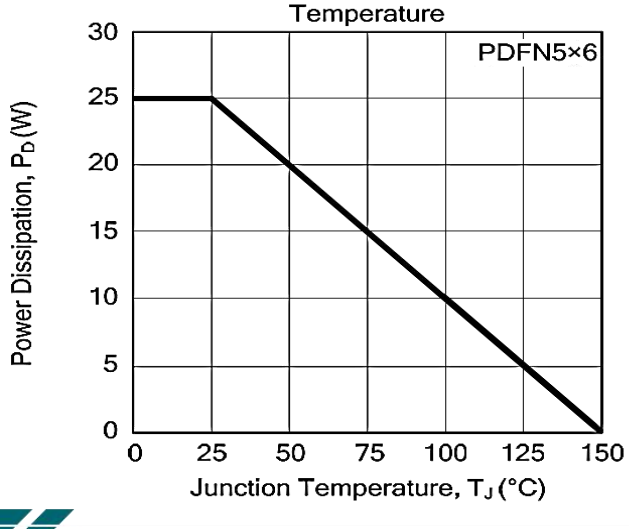
Drain Current vs. Gate-Source Voltage



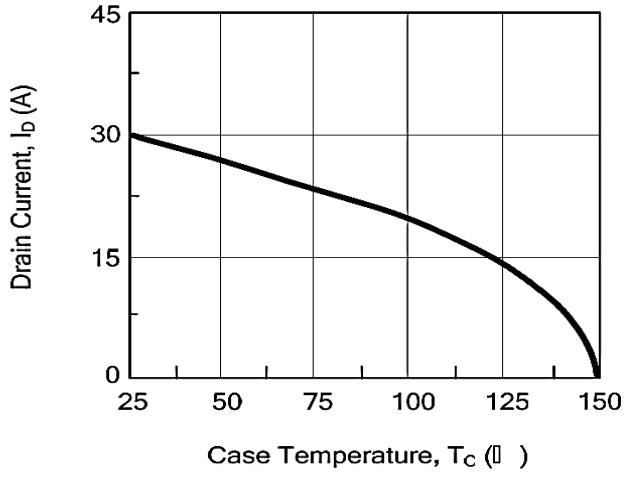
Drain-Source On-Resistance vs. Drain Current



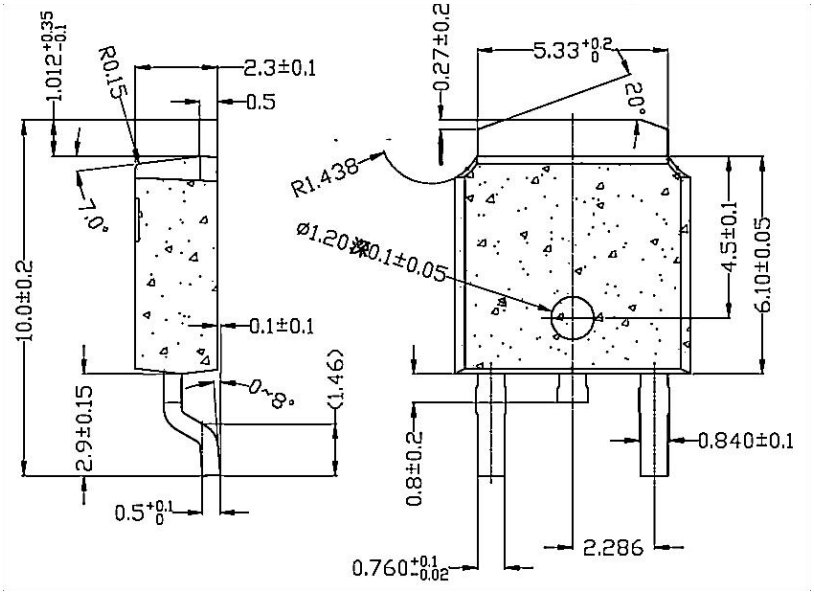
Power Dissipation vs. Junction Temperature

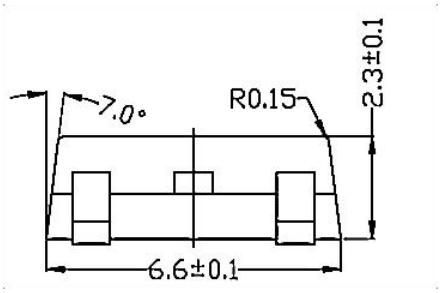


Max. Drain Current vs. Case Temperature

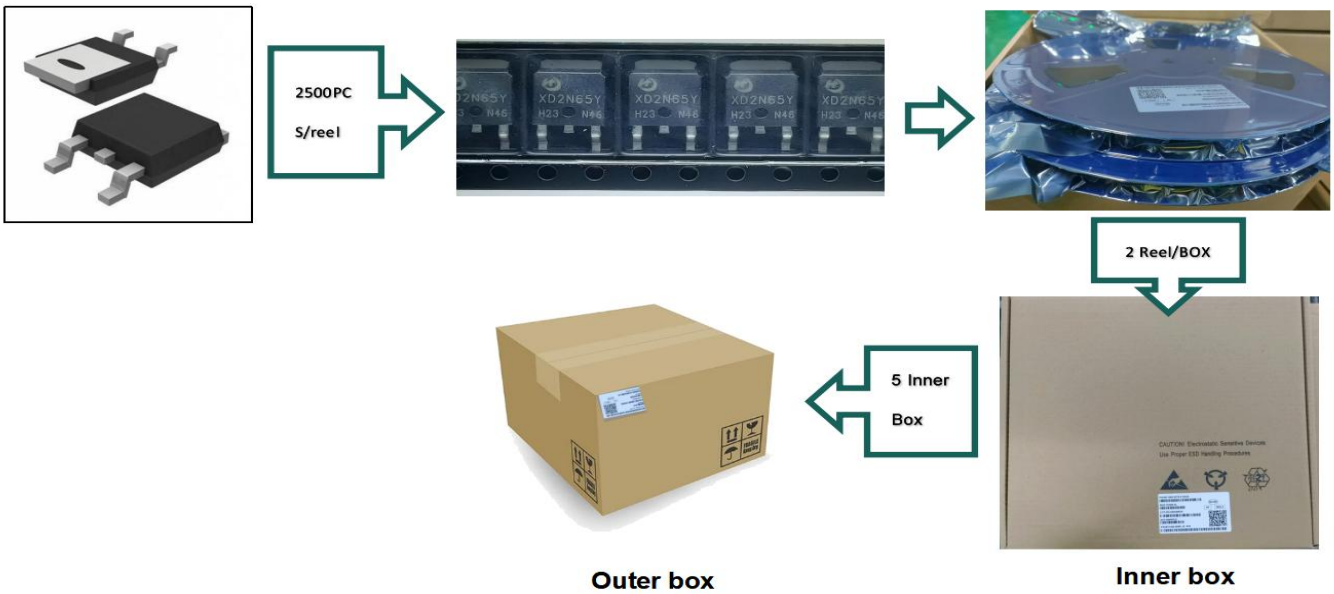


■ TO - 252 PACKAGE OUTLINE DIMENSIONS



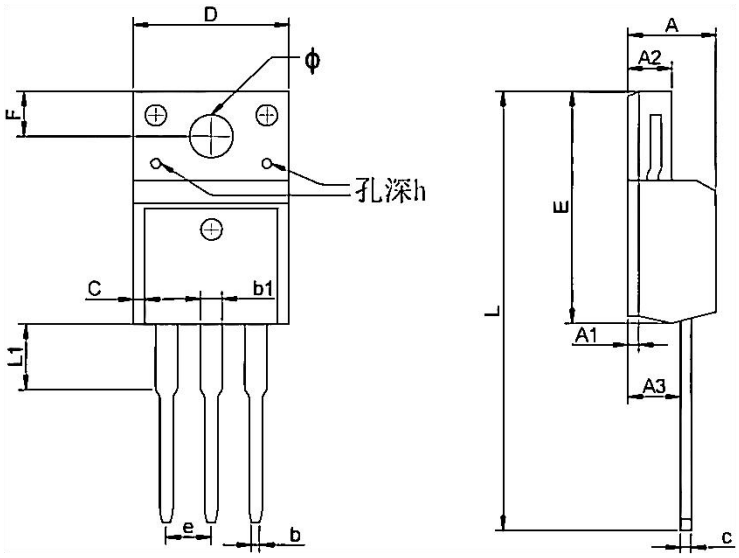


■ TO - 252 PACKING INFORMATION



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