HY12P10

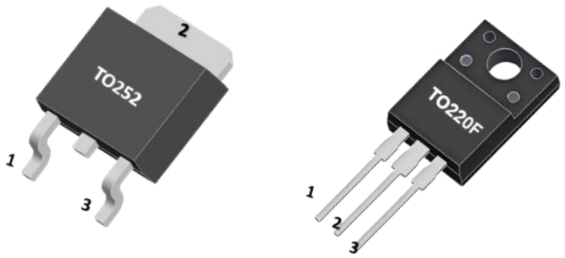
P-CHANNEL POWER MOSFET

-12A, -100V P-CHANNEL POWER MOSFET

■ DESCRIPTION

The HY12P10A is a P-channel power MOSFET using our advanced technology to provide the customers with high switching speed, cost-effectiveness and a minimum on-state resistance. It can also withstand high energy in the avalanche.

The HY12P10A meet the ROHS and Green Product requirement with full function reliability approved.



■ FEATURES

* $R_{DS(ON)}$ ≤ 0.2 Ω @ V_{GS}=-10V, I_D=-12A
* High Switching Speed
* Advanced trench process technology
* Reliable and rugged
* High density cell design for ultra low On-Resistance

■ MARKING

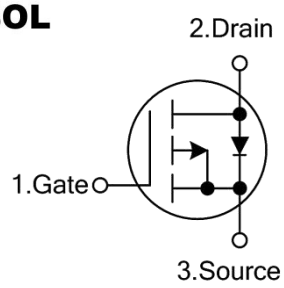
: HY LOGO

HY12P10A=Device Code

XXXX=Date Code

Solid Dot=Green molding compound

SYMBOL



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-100	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current,T_C=25°C,V_{GSS}@-10V		I_D	-12	A
Pulsed Drain Current (Note 2)		I_{DM}	-24	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	18	mJ
Power Dissipation,T_C=25°C	TO-220F	P_D	26	W
	TO-252		44.5	
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +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.

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

3.L = 0.1mH, I_{AS} =-19.2A, V_{DD}= -25V, R_G=25Ω , Starting TJ = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	θJA	62.5	°C/W
	TO-252		110	
Junction to Case	TO-220F	θJC	4.81	°C/W
	TO-252		2.8	

Note: Repetitive rating; pulse width limited by max. junction temperature.

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-100			V
Drain-Source Leakage 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						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS} , I_D=-250μA	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note 2)	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-12A			0.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{DS}=-25V,V_{GS}=0V f= 1.0MHz		1250		pF
Output Capacitance	C_{OSS}			70		pF
Reverse Transfer Capacitance	C_{RSS}			60		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	V_{DS}=-80V, V_{GS}= -10V I_D=-12A		31		nC
Gate-Source Charge	Q_{GS}			5		nC
Gate-Drain Charge	Q_{GD}			8		nC
Turn-On Delay Time	$t_{D(ON)}$	V_{DD}=-50V,I_D=-12A, R_G=9.1Ω		6		ns
Turn-On Rise Time	t_R			18		ns
Turn-Off Delay Time	$t_{D(OFF)}$			45		ns
Turn-Off Fall Time	t_F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				-12	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	(Note 1)			-24	A
Drain-Source Diode Forward Voltage (Note 2)	V_{SD}	T_J=25°C,I_S=-12A,V_{GS}=0V			-5	V
Reverse Recovery Time	trr	T_J=25°C, I_F=-12A d_{IF}/dt=100A/μs (Note 2)		130		ns
Reverse Recovery Charge	Qrr			0.56		μC

Notes:

1. Repetitive rating; pulse width limited by max. junction temperature.
2. Pulse width ≤ 300μs; duty cycle ≤ 2%.

■ TEST CIRCUITS AND WAVEFORMS

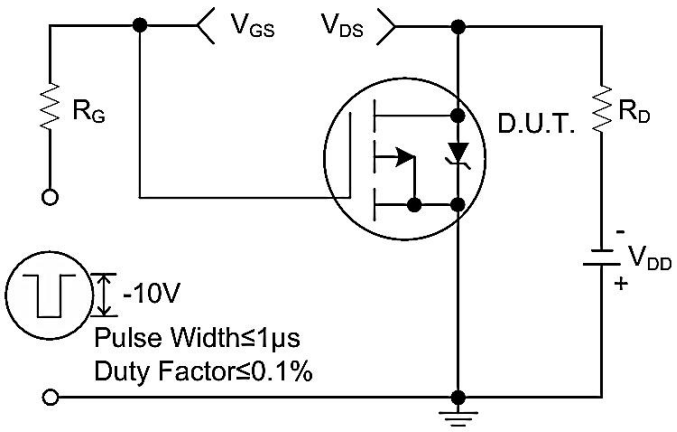


Fig. 1a Switching Time Test Circuit

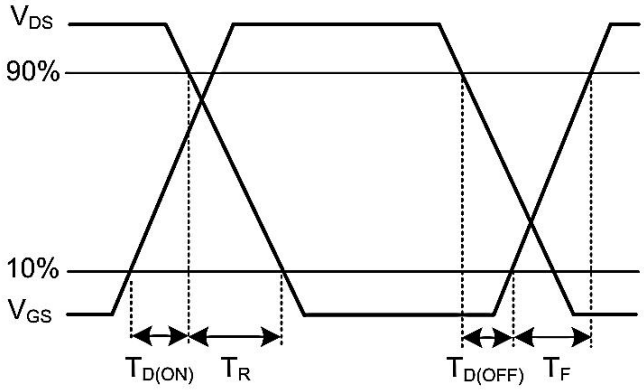


Fig. 1b Switching Time Waveforms

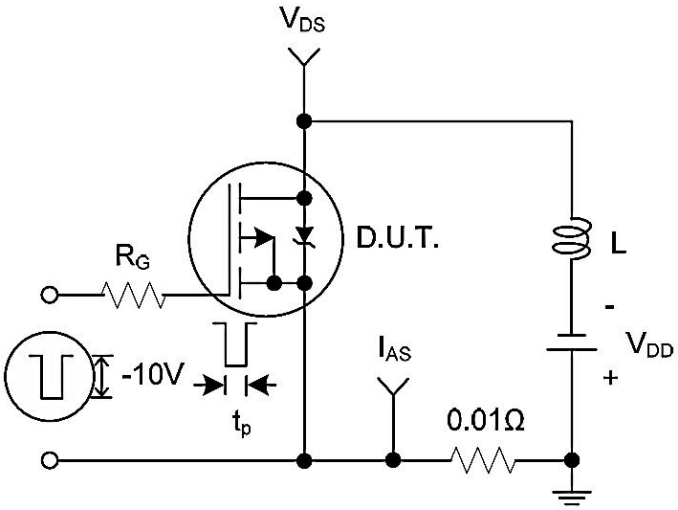


Fig. 2a Unclampled Inductive Test Circuit

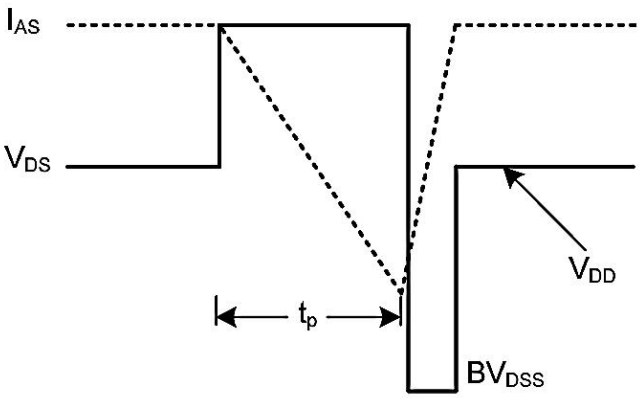


Fig. 2b Unclampled Inductive Waveforms

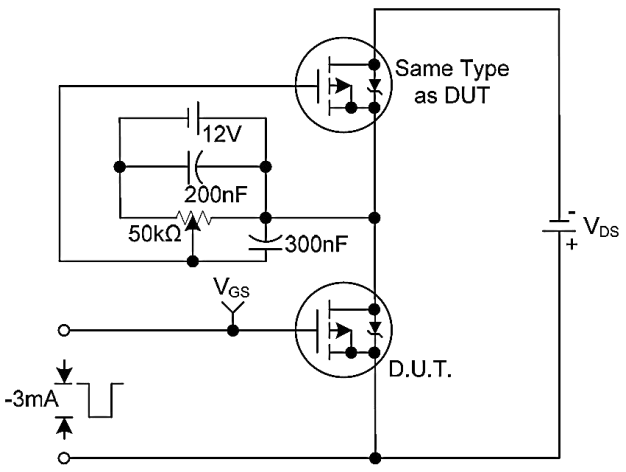


Fig.3a Gate Charge Test Circuit

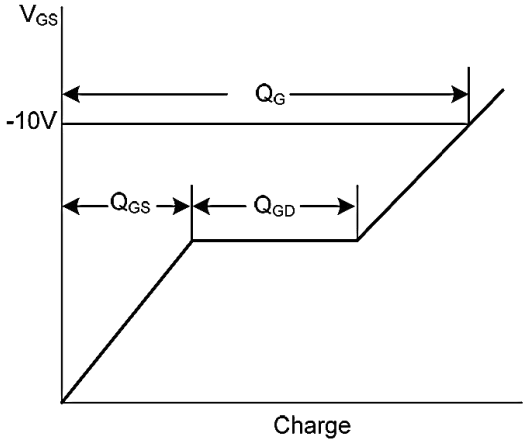
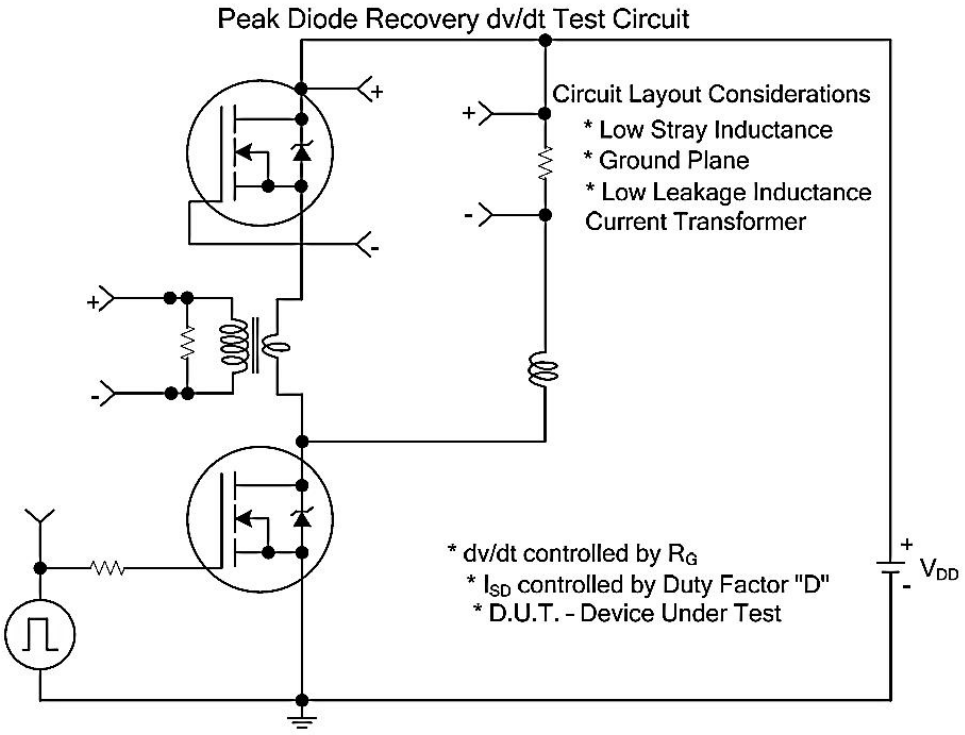
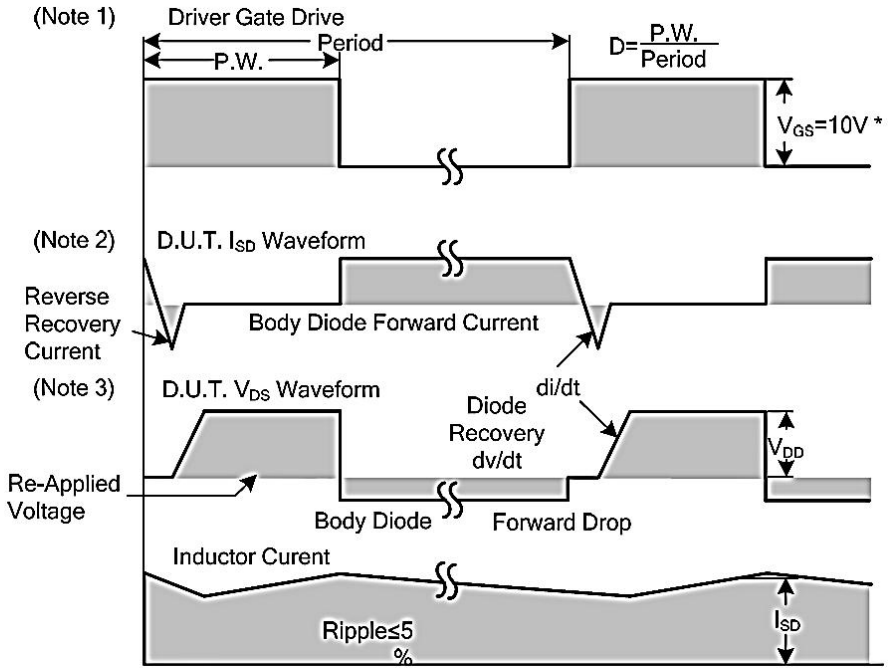


Fig. 3b Gate Charge Waveform

■ TEST CIRCUITS AND WAVEFORMS(Con.t)





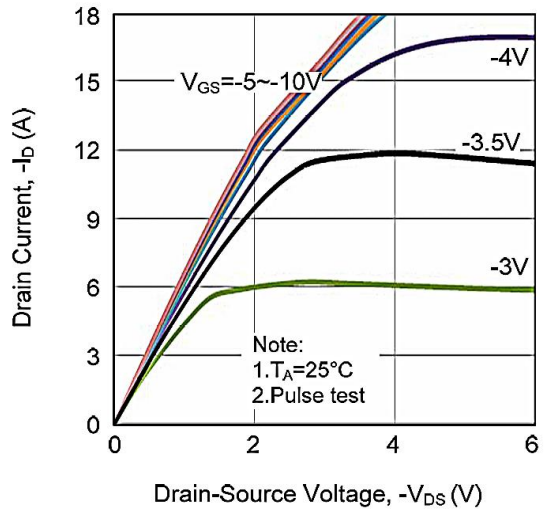
*** V_{GS}=5V for Logic Level and 3V Drive Devices

For N and P Channel Power MOSFET

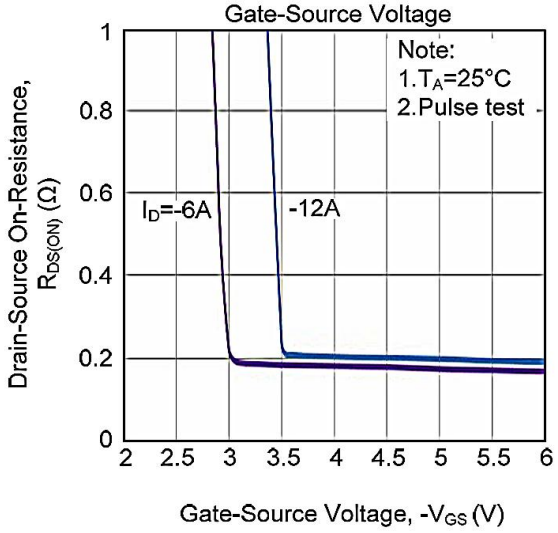
Notes: 1. Repetitive rating; pulse width limited by max. junction temperature.
2. V_{DD}=-25V, starting T_J=25°C, L=2.7mH, R_G=25Ω, I_{AS}=-12A. (See Figure 2)
3. I_{SD}≤-12A, di/dt≤200A/μs, V_{DD}≤BV_{DSS}, T_J≤175°C

■ TYPICAL CHARACTERISTICS

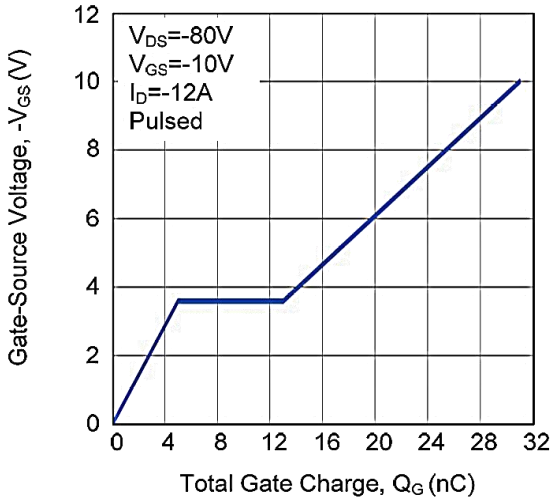
Drain Current vs. Drain-Source Voltage



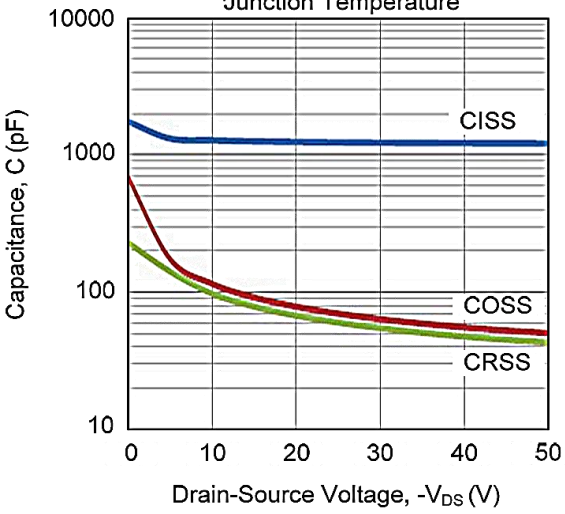
Drain-Source On-Resistance vs. Gate-Source Voltage

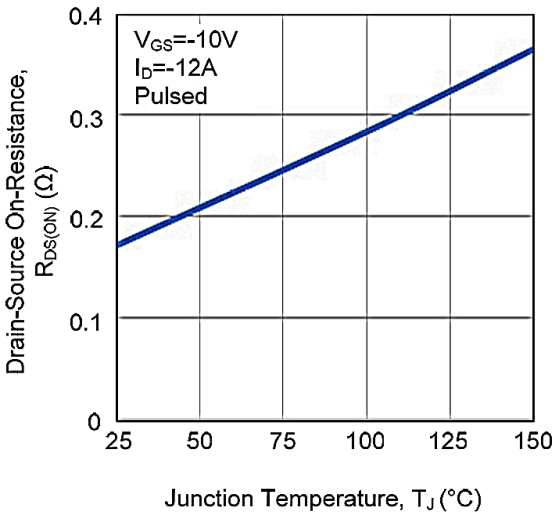


Gate Charge Characteristics

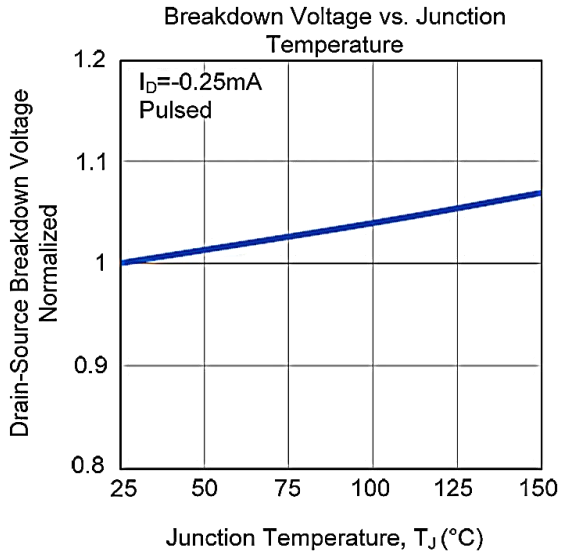


Drain-Source On-Resistance vs. Capacitance Characteristics Junction Temperature



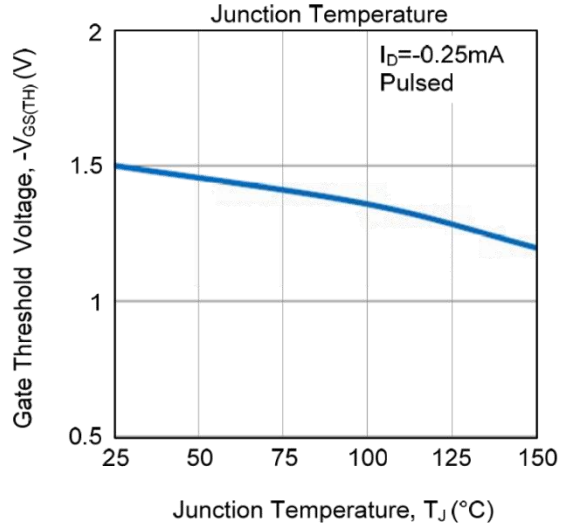


Breakdown Voltage vs. Junction Temperature

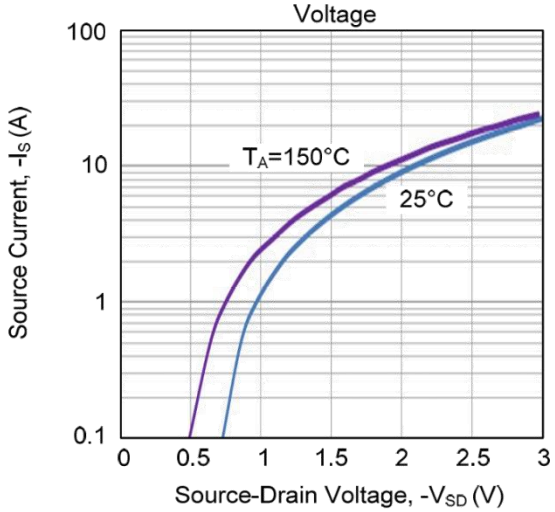


■ TYPICAL CHARACTERISTICS(Con.t)

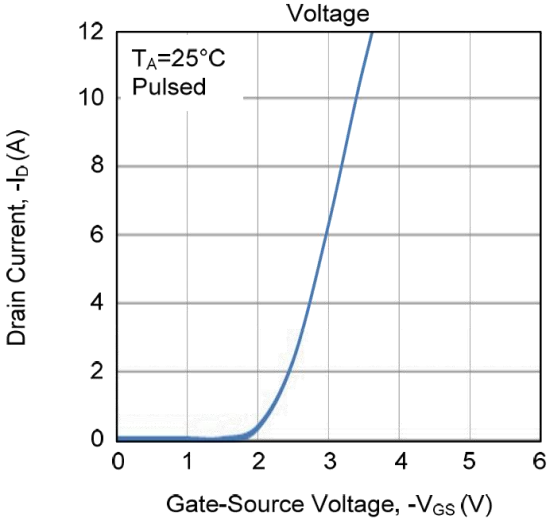
Gate Threshold Voltage vs. Junction Temperature



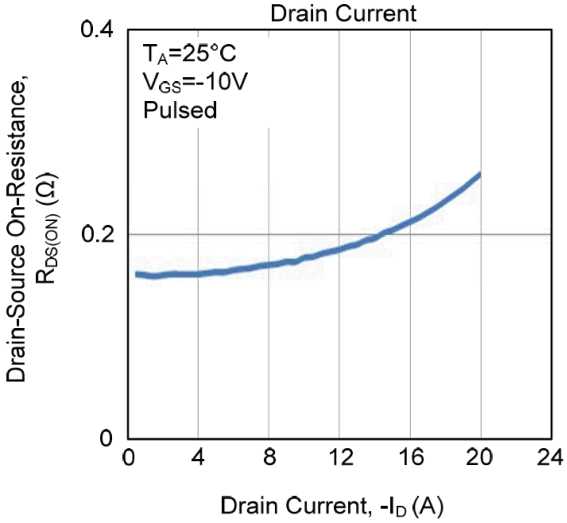
Source Current vs. Source-Drain Voltage



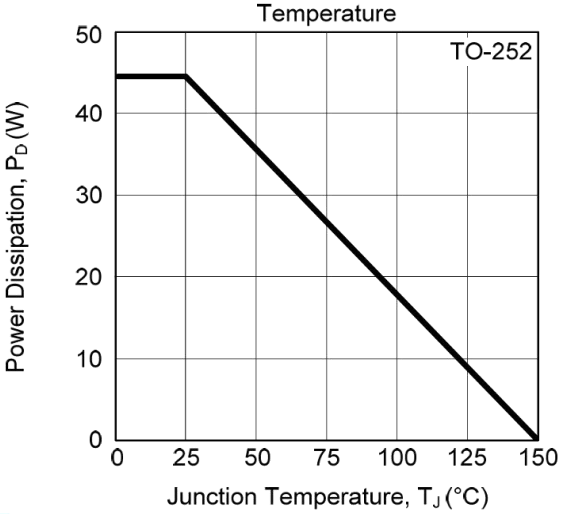
Drain Current vs. Gate-Source Voltage



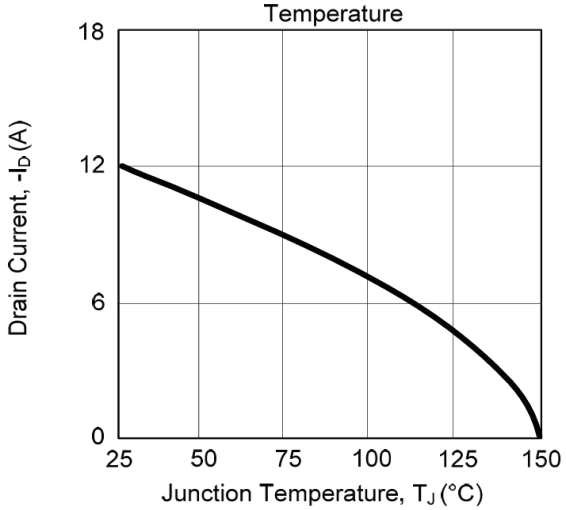
Drain-Source On-Resistance vs. Drain Current



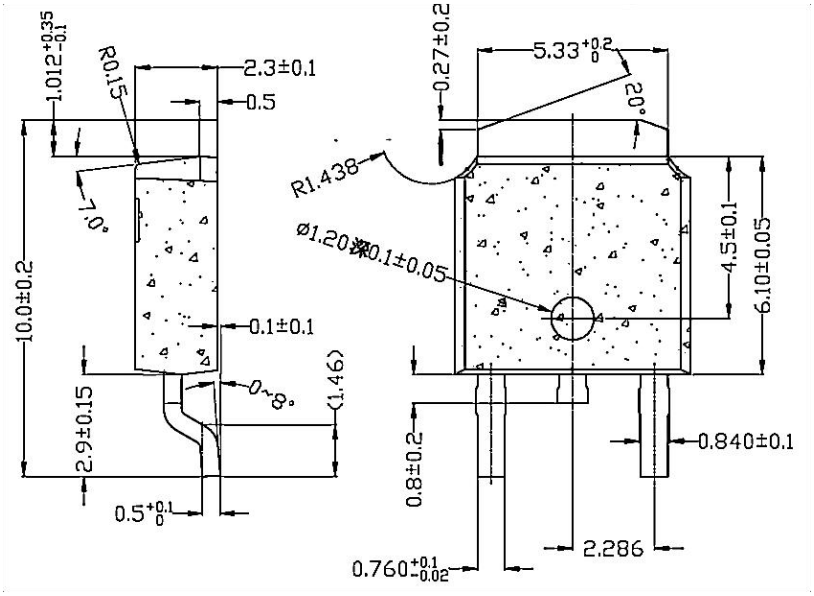
Power Dissipation vs. Junction Temperature

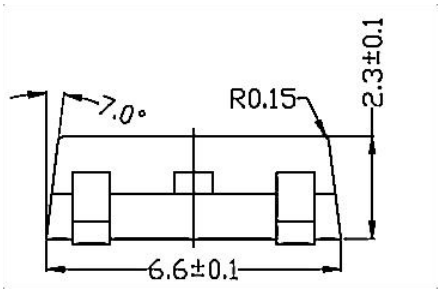


Drain Current vs. Junction Temperature

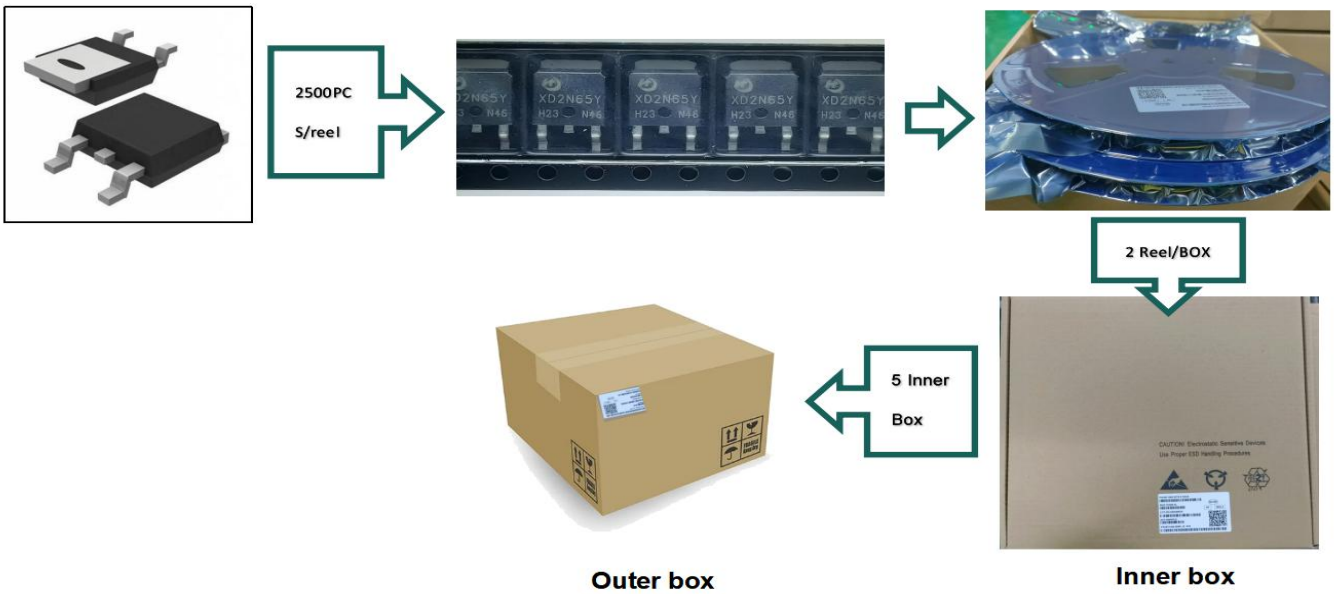


■ TO - 252 PACKAGE OUTLINE DIMENSIONS



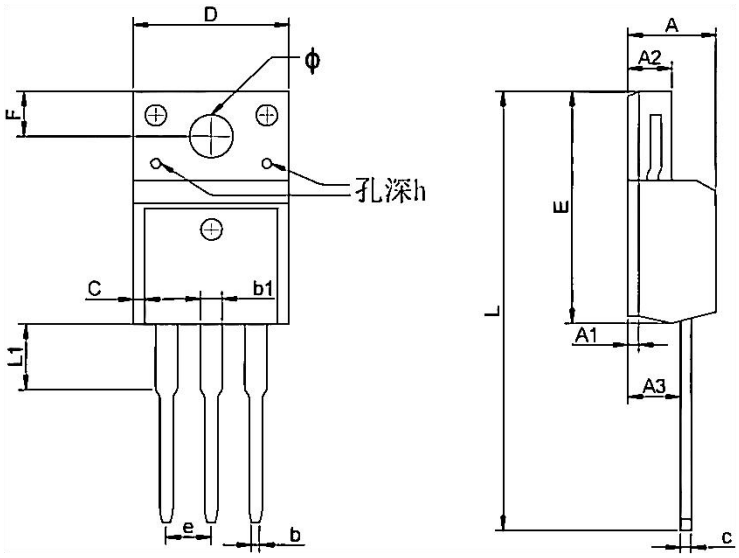


■ TO - 252 PACKING INFORMATION



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