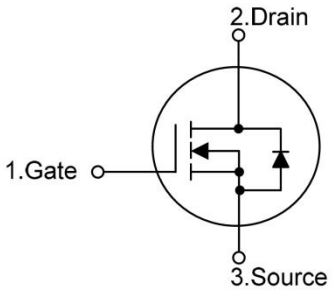
15A, 650V N-CHANNEL POWER MOSFET

■ DESCRIPTION

The HY15N65A is an N-channel mode power MOSFET using our advanced technology to provide costumers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The HY15N65A is universally applied in active power factor correction and high efficient switched mode power supplies.



■ FEATURES

* $R_{DS(ON)}$ < 0.58Ω @ V_{GS} = 10 V, I_D =1 A
* High switching speed
* Improved dv/dt capability

■ MARKING

: HY LOGO
HY15N65A=Device Code
XXXX=Date Code
Solid Dot=Green molding compound

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

SYMBOL	PARAMETER		VALUE	UNIT
V_{DSS}	Drain-Source Voltage		650	V
V_{GSS}	Gate Source Voltage		±30	V
I_D	Continuous Drain Current		15	A
I_{DM}	Pulsed Drain Current (Note 2)		60	A
I_{AR}	Avalanche Current (Note 2)		6.4	A
E_{AS}	Avalanche Energy	Single Pulsed (Note 3)	205	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 4)		2.45	V/ns
P_D	Power Dissipation		54	W
T_J	Junction Temperature		150	°C
T_{STG}	Storage 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.
2.Repetitive Rating: Pulse width limited by maximum junction temperature.
3.L = 10mH, I_{AS} = 6.4A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C.
4.I_{SD} ≤ 15A, di/dt ≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θJA	62	°C/W
Junction to Case	θJC	2.3	°C/W

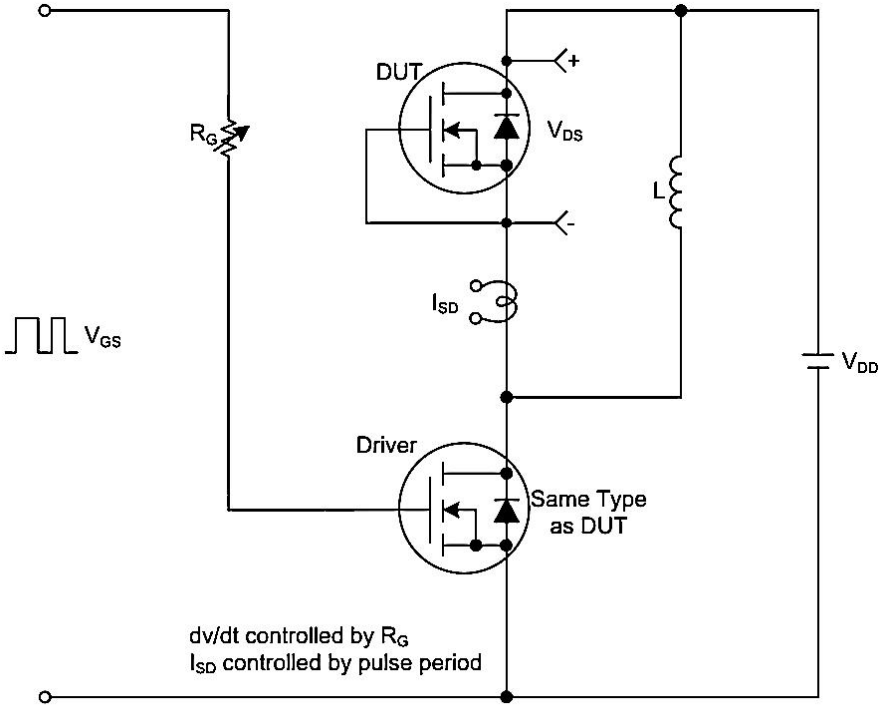
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

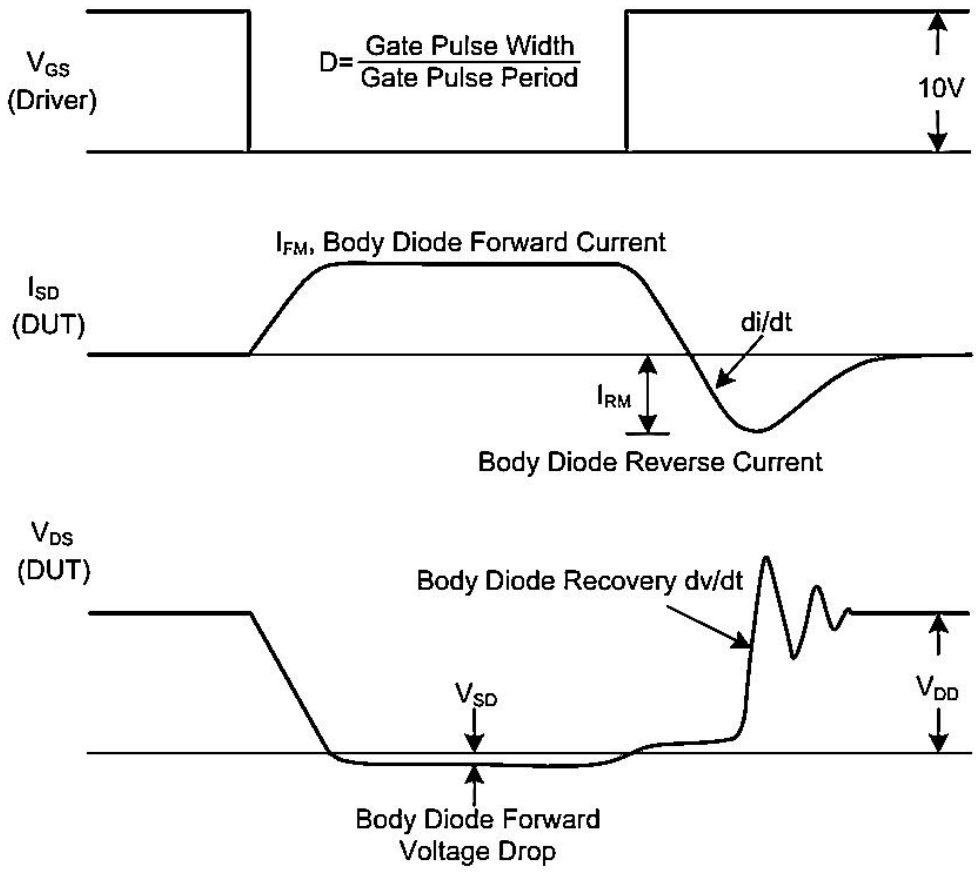
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BVDSS	VGS=0V, ID=250μA	650			V
Drain-Source Leakage Current		IDSS	VDS=650V, VGS=0V			1	μA
Gate- Source Leakage Current	Forward	IGSS	VGS=30V, VDS=0V			100	nA
	Reverse		VGS=-30V, VDS=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		VGS(TH)	VDS=VGS , ID=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		RDS(ON)	VGS=10V, ID=7.5A			0.65	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		CISS	VDS=25V,VGS=0V f= 1.0MHz		2700		pF
Output Capacitance		COSS			240		pF
Reverse Transfer Capacitance		CRSS			26		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		QG	VDS=300V, VGS= 10V ID=10A,IG=1mA (Note 1, 2)		60		nC
Gate-Source Charge		QGS			16		nC
Gate-Drain Charge		QGD			18		nC
Turn-On Delay Time (Note 1)		tD(ON)	VDD=300V,ID=10A,VGS= 10V RG=25Ω (Note 1, 2)		30		ns
Turn-On Rise Time		tR			28		ns
Turn-Off Delay Time		tD(OFF)			194		ns
Turn-Off Fall Time		tF			43		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		IS				15	A
Maximum Body-Diode Pulsed Current		ISM				60	A
Drain-Source Diode Forward Voltage (Note 1)		VSD	IS=15A , VGS=0V			1.4	V
Reverse Recovery Time (Note 1)		trr	IS=15A,VGS=0 Vdi/dt=100A/μs		510		ns
Reverse Recovery Charge		Qrr			8.2		μC

Note: 1.Pulse test: pulse width ≤ 300us, duty cycle ≤ 2%； 2.Essentially independent of operating temperature.

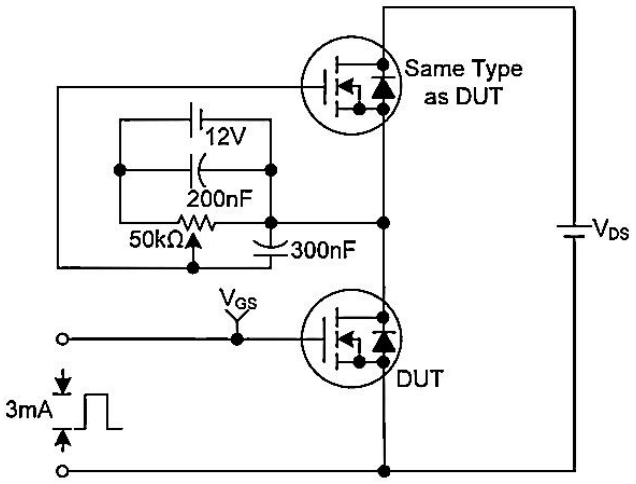
■ TEST CIRCUITS AND WAVEFORMS



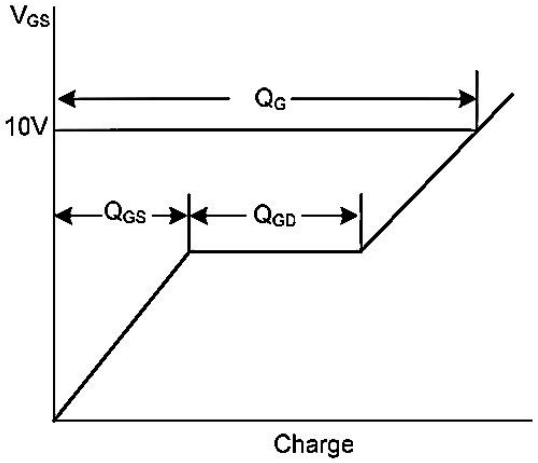
Peak Diode Recovery dv/dt Test Circuit & Waveforms



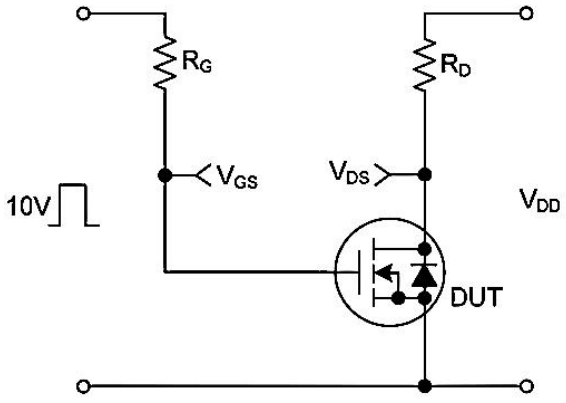
■ TEST CIRCUITS AND WAVEFORMS(Con.t)



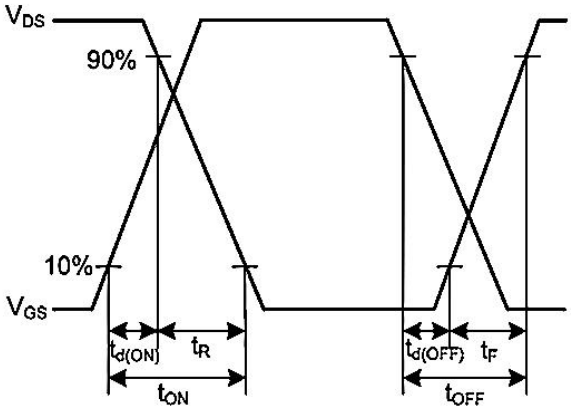
Gate Charge Test Circuit



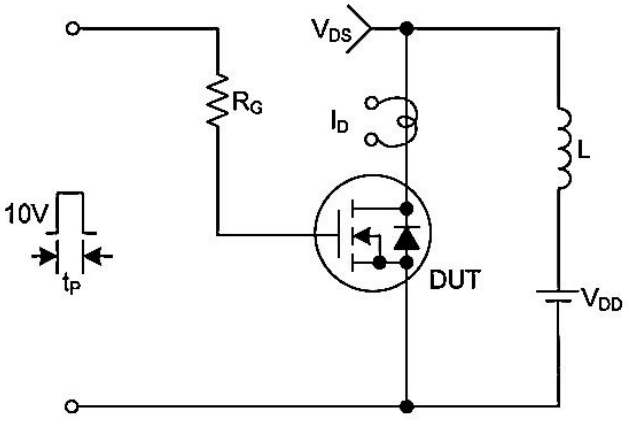
Gate Charge Waveforms



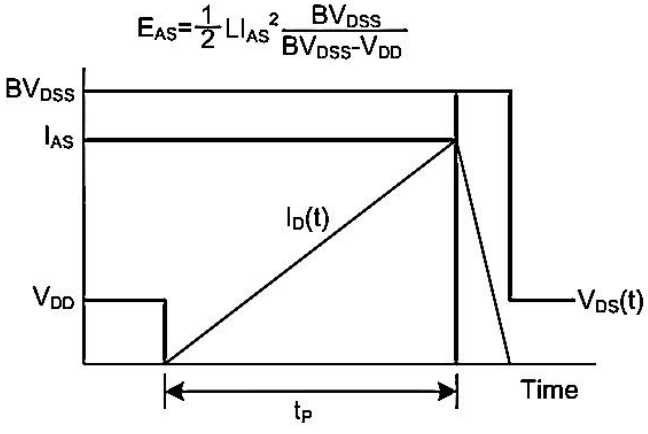
Resistive Switching Test Circuit



Resistive Switching Waveforms



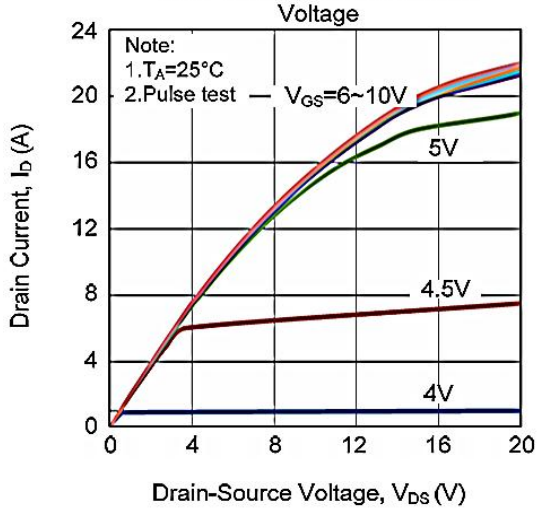
Unclamped Inductive Switching Test Circuit



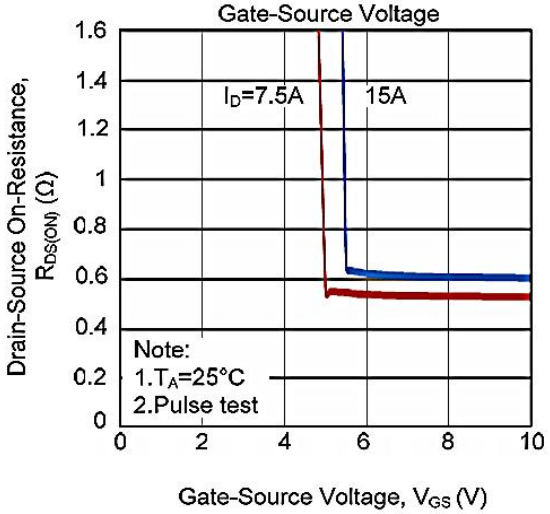
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

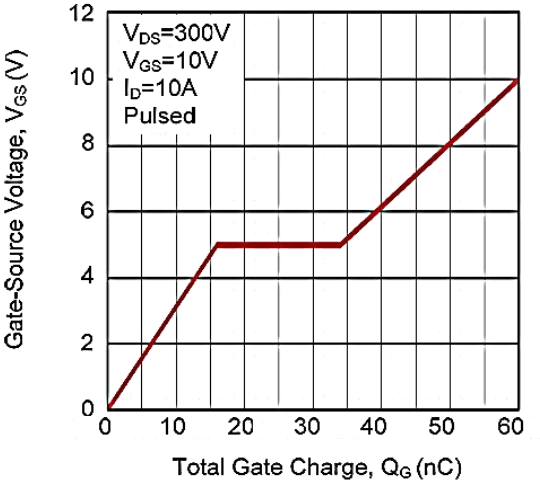
Drain Current vs. Drain-Source Voltage



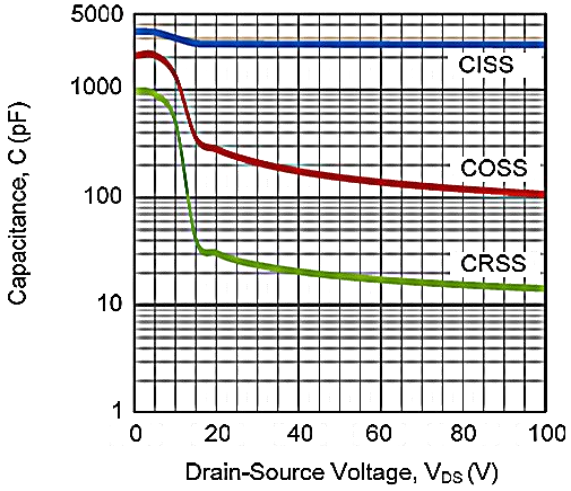
Drain-Source On-Resistance vs. Gate-Source Voltage



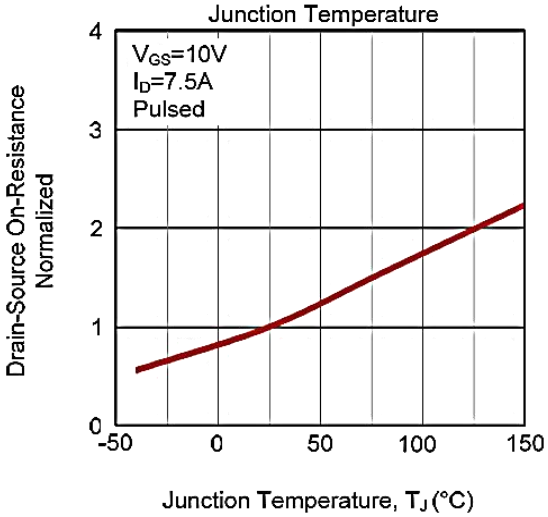
Gate Charge Characteristics



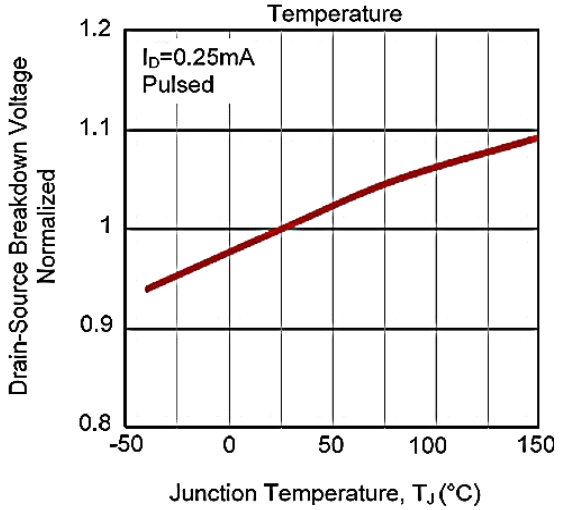
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

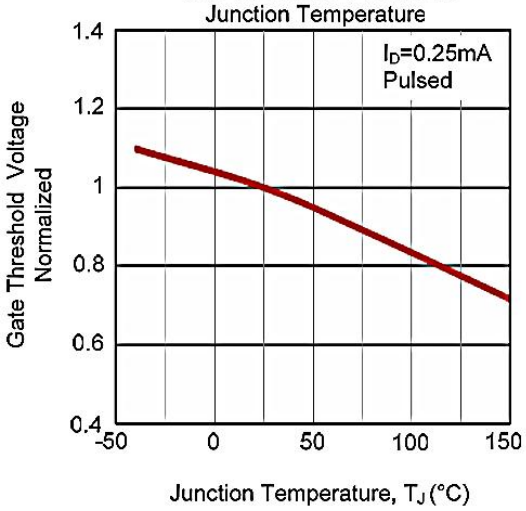


Breakdown Voltage vs. Junction Temperature

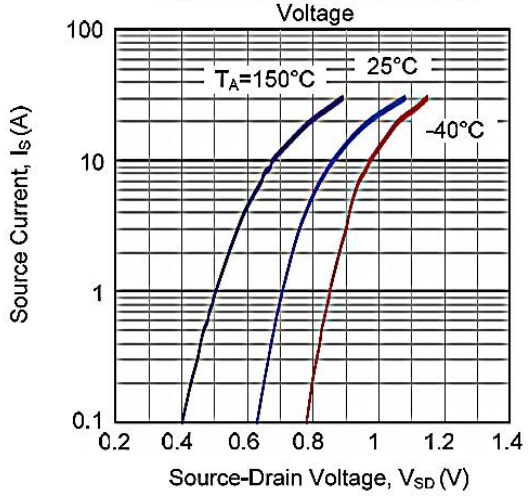


■ TYPICAL CHARACTERISTICS(Con.t)

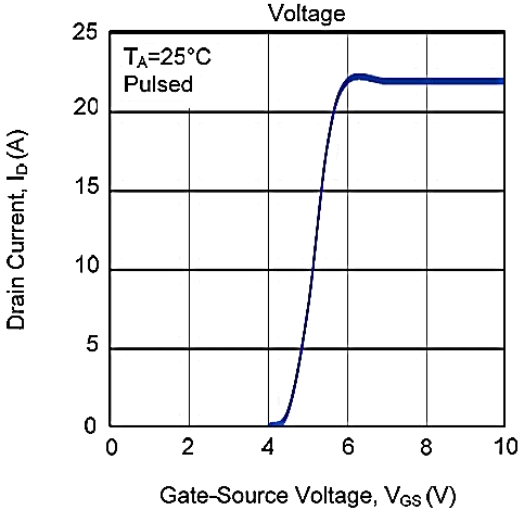
Gate Threshold Voltage vs. Junction Temperature



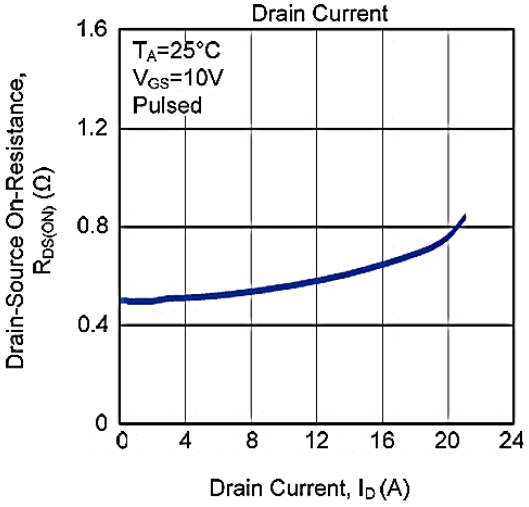
Source Current vs. Source-Drain Voltage



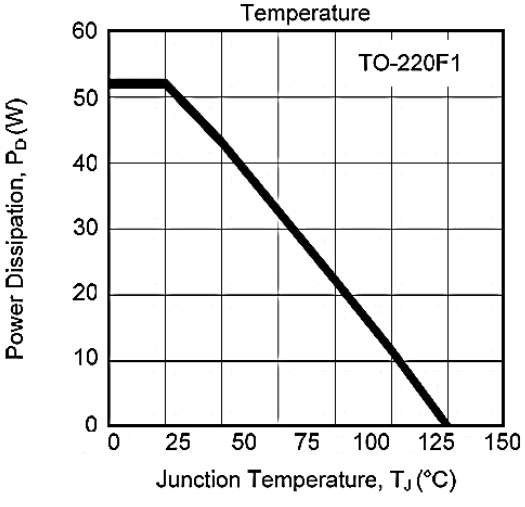
Drain Current vs. Gate-Source Voltage



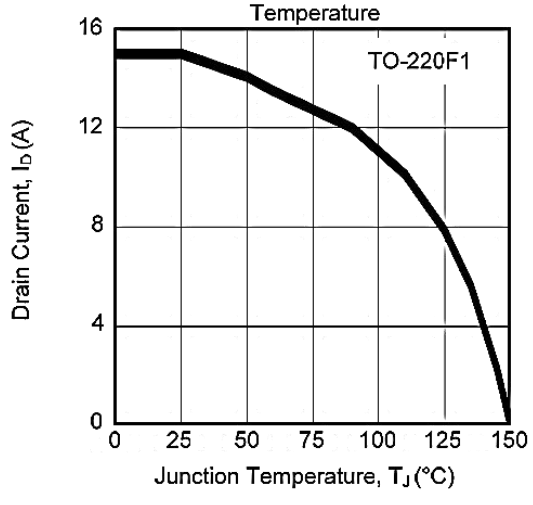
Drain-Source On-Resistance vs. Drain Current



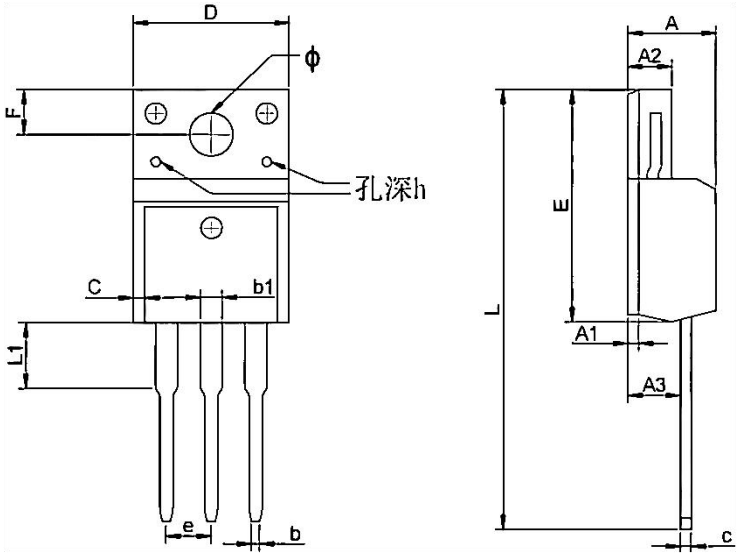
Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TO - 220F PACKAGE OUTLINE DIMENSIONS

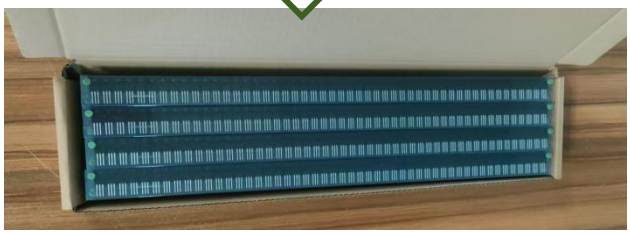


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max	Min	Max
A	4.300	4.750	0.169	0.185
A1	1.830 REF		0.072 REF	
A2	2.300	2.850	0.090	0.112
A3	2.500	2.900	0.098	0.114
b	0.400	0.420	0.016	0.016
b1	1.220	1.280	0.048	0.050
C	0.690	0.720	0.027	0.028
c	0.490	0.510	0.019	0.020
D	9.960	10.200	0.392	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