

12N65

N-CHANNEL POWER MOSFET

12A, 650V N-CHANNEL POWER MOSFET

DESCRIPTION

The 12N65 are N-Channel enhancement mode power field effect transistors (MOSFET) which are produced by using our proprietary, planar stripe and DMOS technology.

These devices are suited for high efficiency switch mode power supply. To minimize on-state resistance, provide superior switching performance and withstand high energy pulse in the avalanche and commutation mode, the advanced technology has been especially tailored.

FEATURES

- * $R_{DS(ON)} \leq 0.88 \Omega$ @ $V_{GS} = 10V$, $I_D = 1.0A$
- * Ultra low gate charge (typical 42 nC)
- * Low reverse transfer capacitance ($CR_{SS} =$ typical 15 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

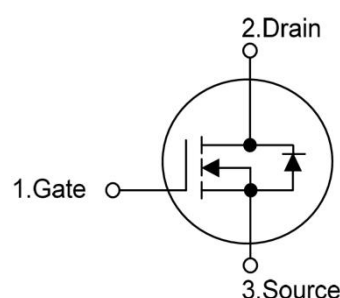
MARKING



12N65=Device Code

XXX=Date Code

Solid Dot=Green molding compound



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	12	A
Continuous Drain Current		I_D	12	A
Pulsed Drain Current (Note 2)		I_{DM}	24	A
Avalanche Energy	Single Pulsed (Note 3)	EAS	75	mJ
	Repetitive (Note 2)	EAR	24	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D	51	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C
Operating Temperature		T_{OPR}	-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.



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

3.L = 5mH, IAS = 5.5A, VDD= 50V, RG=25Ω , Starting TJ = 25°C

4.ISD ≤ 12A, di/dt ≤ 200A/μs, VDD≤ BVDS , Starting TJ = 25°C

THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	2.45	°C/W

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

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

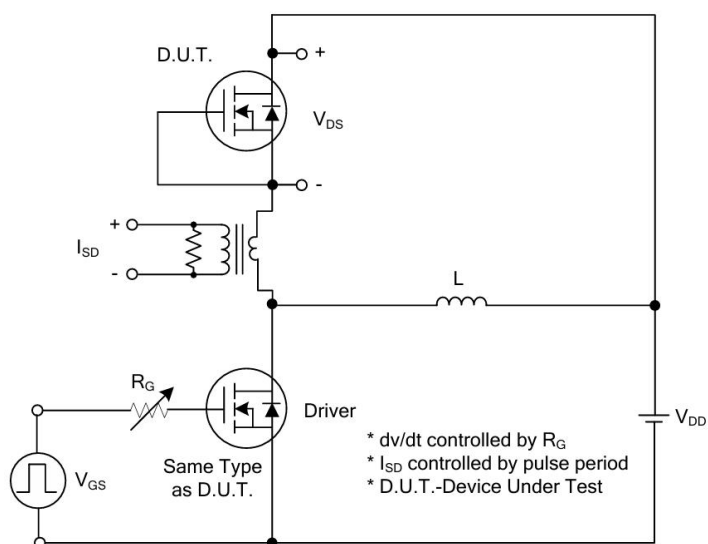
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BVDSS	VGS=0V, ID=250μA	650			V
Drain-Source Leakage Current	IDSS	VDS=650V, VGS=0V			1	μA
Gate- Source Leakage Current	IGSS	VGS=±30V, VDS=0V			±100	nA
Breakdown Voltage Temperature Coefficient	△BVDSS/△TJ	ID=250μA,Referenced to 25°C		0.7		V/°C
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=1.0A		0.6	0.88	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	CISS	VDS=25V,VGS=0V f= 1.0MHz		2190	2600	pF
Output Capacitance	COSS			160	270	pF
Reverse Transfer Capacitance	CRSS			7	15	pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	QG	VDS=520V, VGS= 10V ID=12A (Note 1, 2)		42	54	nC
Gate-Source Charge	QGS			8.6		nC
Gate-Drain Charge	QGD			21		nC
Turn-On Delay Time	tD(ON)	VDD= 325V,ID=12A, RG=25Ω (Note 1, 2)		30	70	ns
Turn-On Rise Time	tR			115	240	ns
Turn-Off Delay Time	tD(OFF)			95	200	ns
Turn-Off Fall Time	tF			85	180	ns

SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS

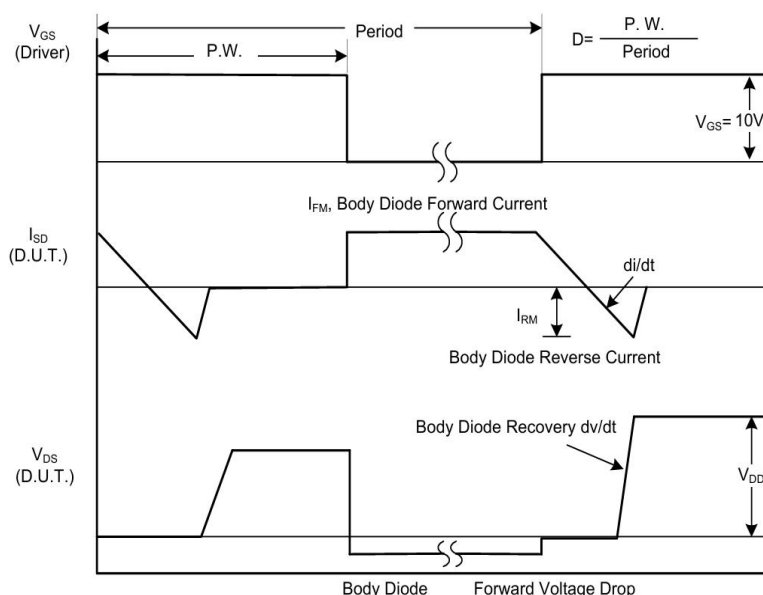
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Continuous Drain-Source Diode Forward Current	I_S				12	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				15	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=5A, V_{GS}=0V$			1	V
Reverse Recovery Time	t_{rr}	$I_S=12A, V_{GS}=0V, di/dt=100A/\mu s$ (Note 1, 2)		380		ns
Reverse Recovery Charge	Q_{rr}			3.5		μC

Note: 1.Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$; 2.Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit

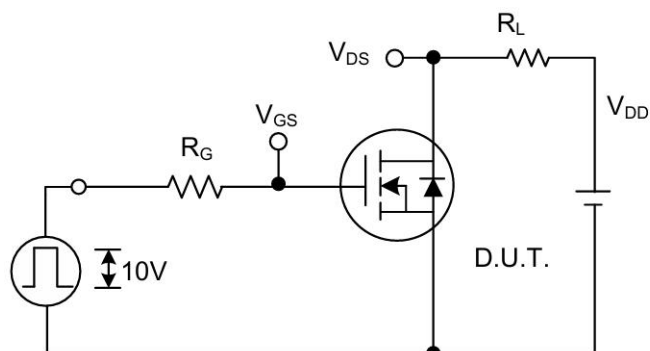


Peak Diode Recovery dv/dt Waveforms

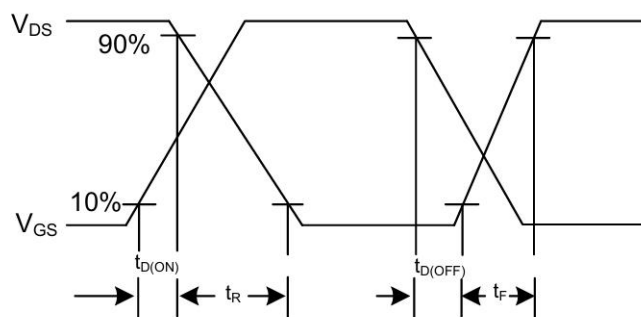
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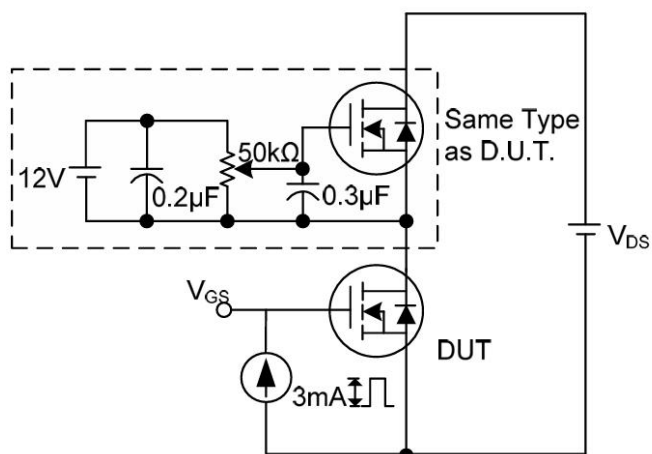
■ TEST CIRCUITS AND WAVEFORMS(Con.t)



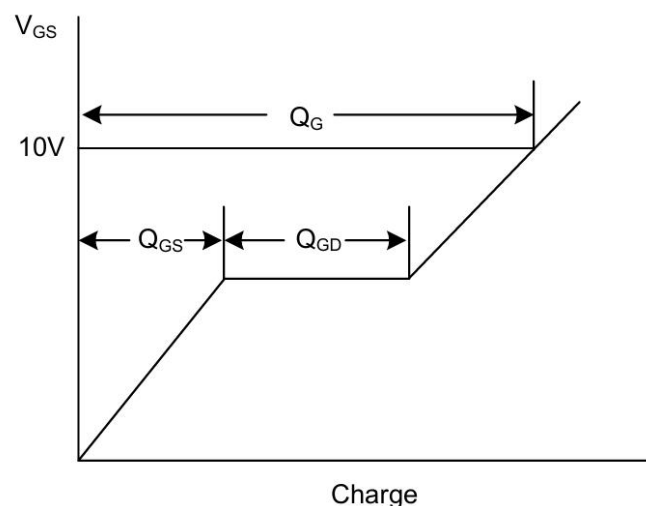
Switching Test Circuit



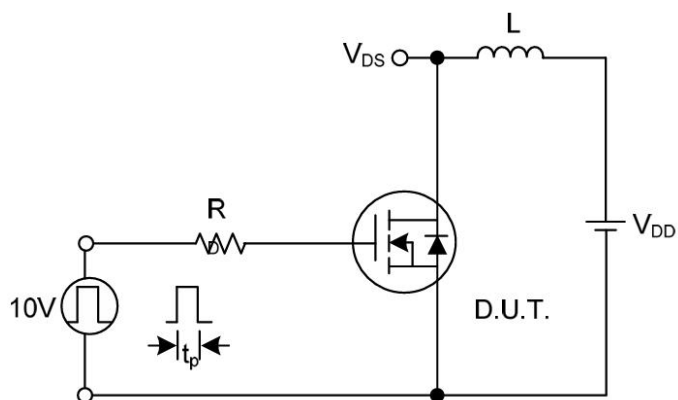
Switching Waveforms



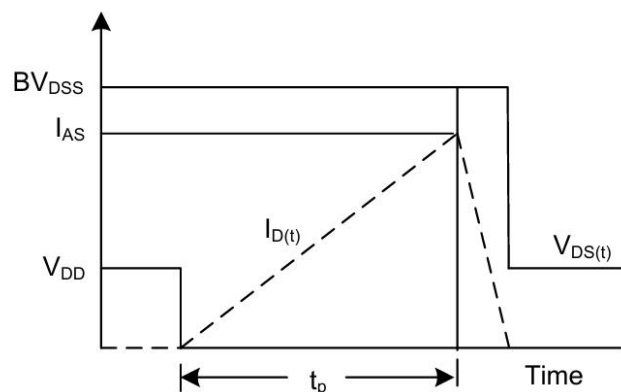
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

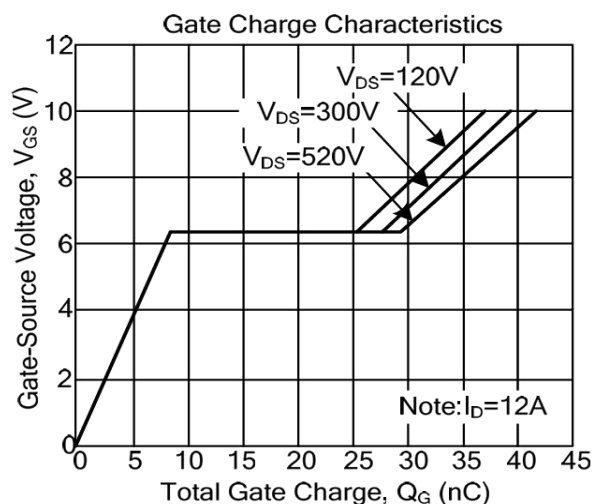
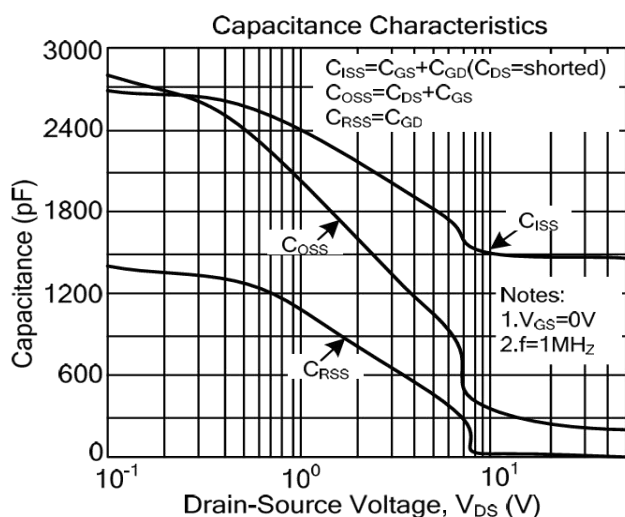
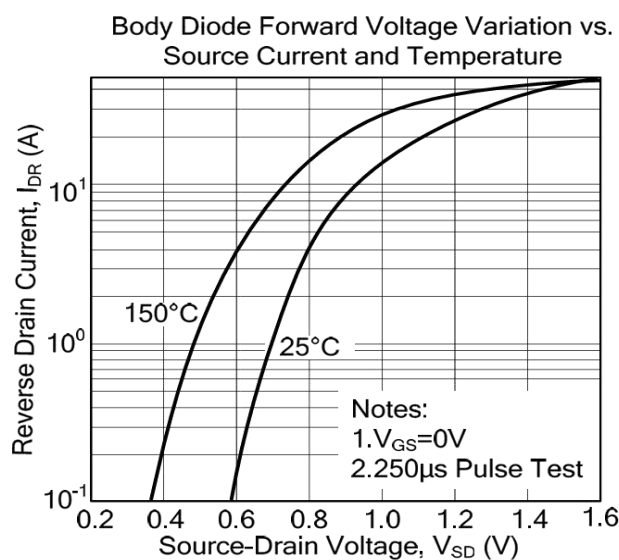
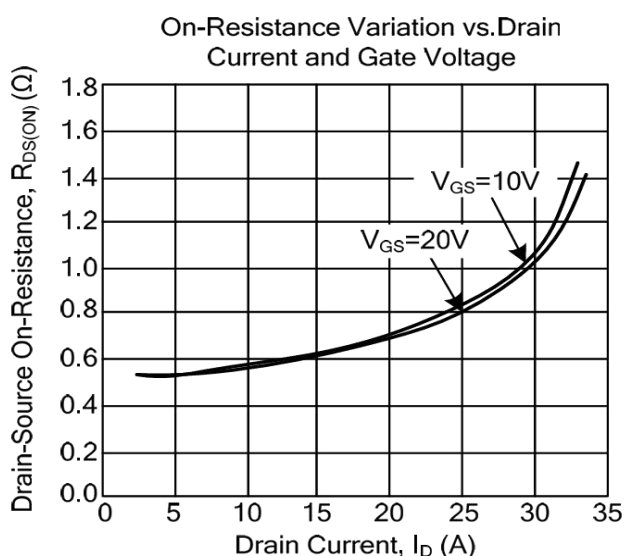
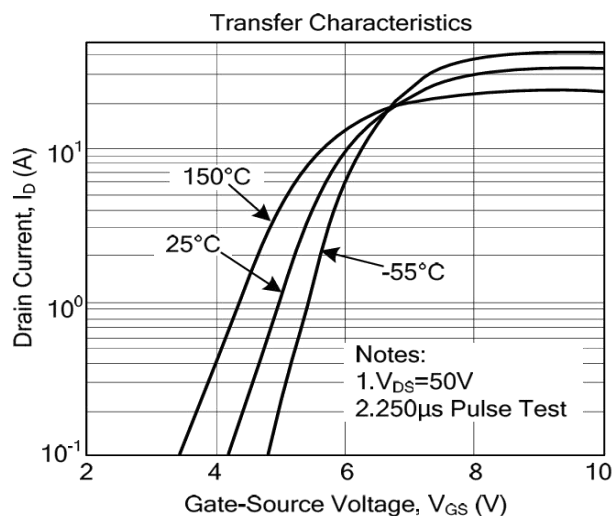
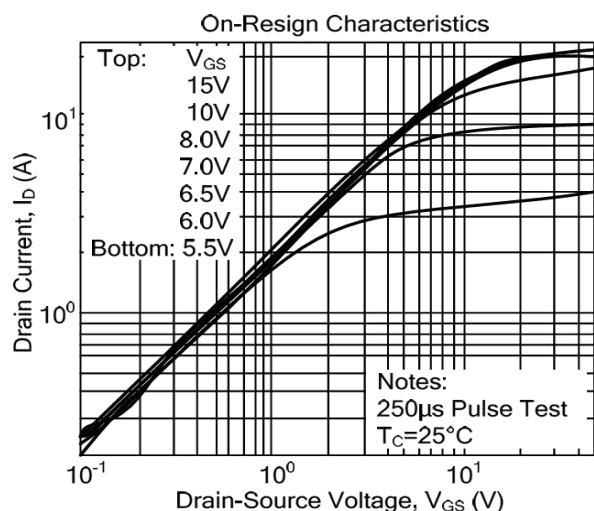


Unclamped Inductive Switching Waveforms

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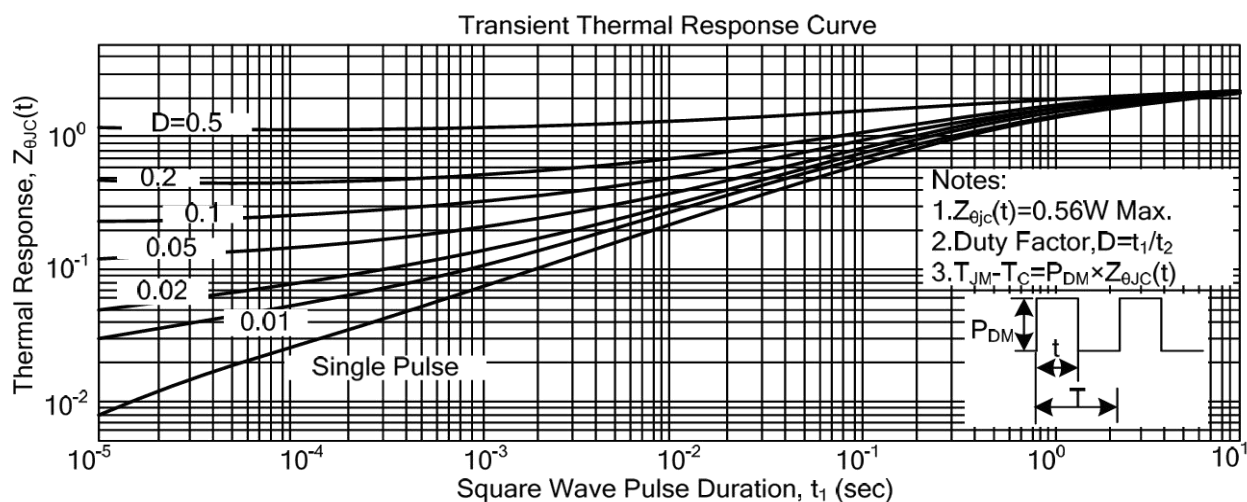
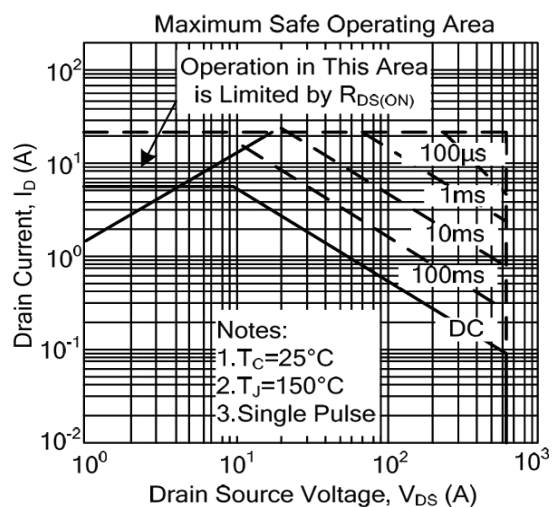
■ TYPICAL CHARACTERISTICS



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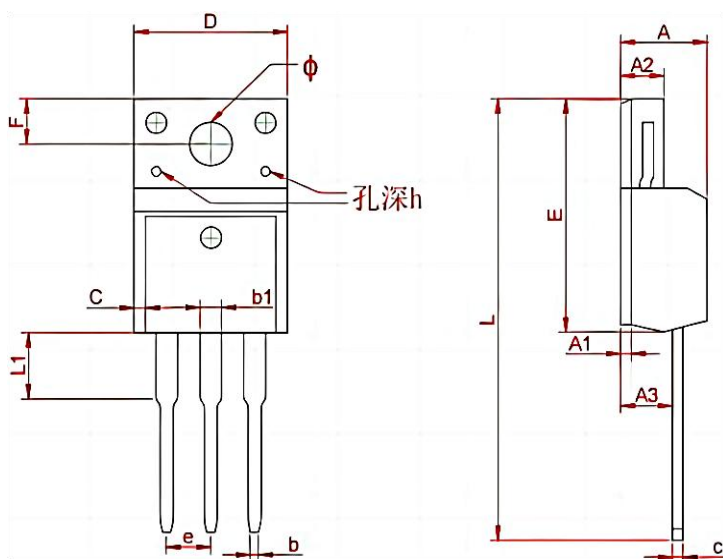
■ TYPICAL CHARACTERISTICS(Con.t)



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TO - 220F PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters	
	Min	Max
A	4.300	4.750
A1	0.7 REF	
A2	2.300	2.850
A3	2.500	2.900
b	0.380	0.420
b1	1.220	1.280
C	1.08	1.200
c	0.480	0.520
D	10.15	10.450
E	15.700	15.950
e	2.574 TYP	
F	3.470 REF	
y	3.200 REF	
h	0.000	0.800
L	28.780	28.900
L1	2.990	3.100

TO - 220F PACKING INFORMATION

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