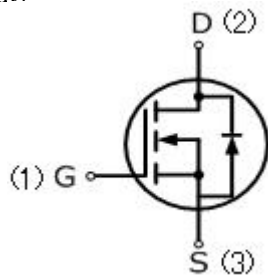


4N90F

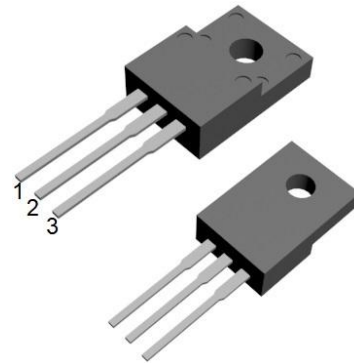
4 Amps,900 Volts N-CHANNEL Power MOSFET

FEATURE

- 4A,900V, $R_{DS(ON)MAX}=4.8\ \Omega$ @ $V_{GS}=10V/2A$
- Low gate charge
- Low C_{iss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- Halogen free



TO-220MF-3L



Absolute Maximum Ratings ($T_C=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	4N90F	UNIT
Drain-Source Voltage	V_{DSS}	900	V
Gate-Source Voltage	V_{GSS}	± 30	
Continuous Drain Current	I_D	4	A
Pulsed Drain Current(Note1)	I_{DM}	16	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	150	mJ
Reverse Diode dV/dt (Note 3)	dv/dt	5	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55to+150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	260	$^\circ\text{C}$

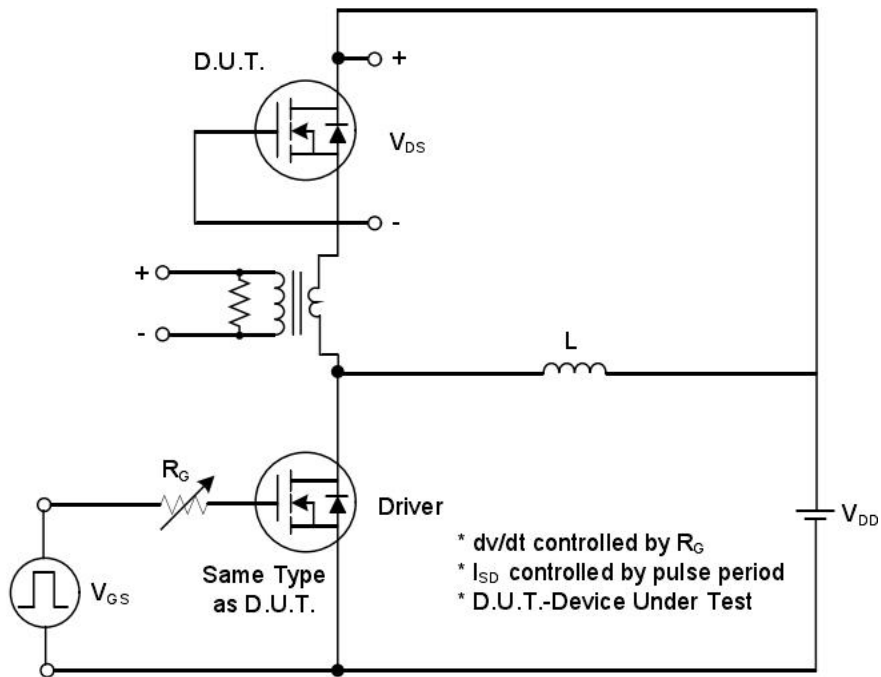
Parameter	Symbol	4N90F	Units
Thermal resistance , Channel to Case	$R_{th(ch-c)}$	4.17	$^\circ\text{C}/\text{W}$
Maximum Power Dissipation	$T_C=25^\circ\text{C}$ P_D	30	W

Electrical Characteristics (T _c =25°C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	900	—	—	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =900V, V _{GS} =0V	—	—	1	uA
Gate-Body Leakage Current, Forward	I _{GSSF}	V _{GS} =30V, V _{DS} =0V	—	—	100	nA
Gate-Body Leakage Current, Reverse	I _{GSSR}	V _{GS} =-30V, V _{DS} =0V	—	—	-100	nA
On Characteristics						
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	2	—	4	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =2A	—	3.6	4.8	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHZ	—	490	—	pF
Output Capacitance	C _{oss}		—	50	—	pF
Reverse Transfer Capacitance	C _{rss}		—	25	—	pF
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{DD} =400V, I _D =4A, R _G =12Ω (Note3,4)	—	10	—	ns
Turn-On Rise Time	t _r		—	10	—	ns
Turn-Off Delay Time	t _{d(off)}		—	30	—	ns
Turn-Off Fall Time	t _f		—	15	—	ns
Total Gate Charge	Q _g	V _{DS} =400V, I _D =4A, V _{GS} =10V, (Note3,4)	—	16	—	nC
Gate-Source Charge	Q _{gs}		—	3	—	nC
Gate-Drain Charge	Q _{gd}		—	6	—	nC
Drain-Source Body Diode Characteristics and Maximum Ratings						
Continuous Diode Forward Current	I _S		—	—	4	A
Pulsed Diode Forward Current	I _{SM}		—	—	16	A
Diode Forward Voltage	V _{SD}	I _S =4A, V _{GS} =0V	—	—	1.5	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _S =4A, dI _F /dt=100A/us, (Note3)	—	135	—	ns
Reverse Recovery Charge	Q _{rr}		—	446	—	nC

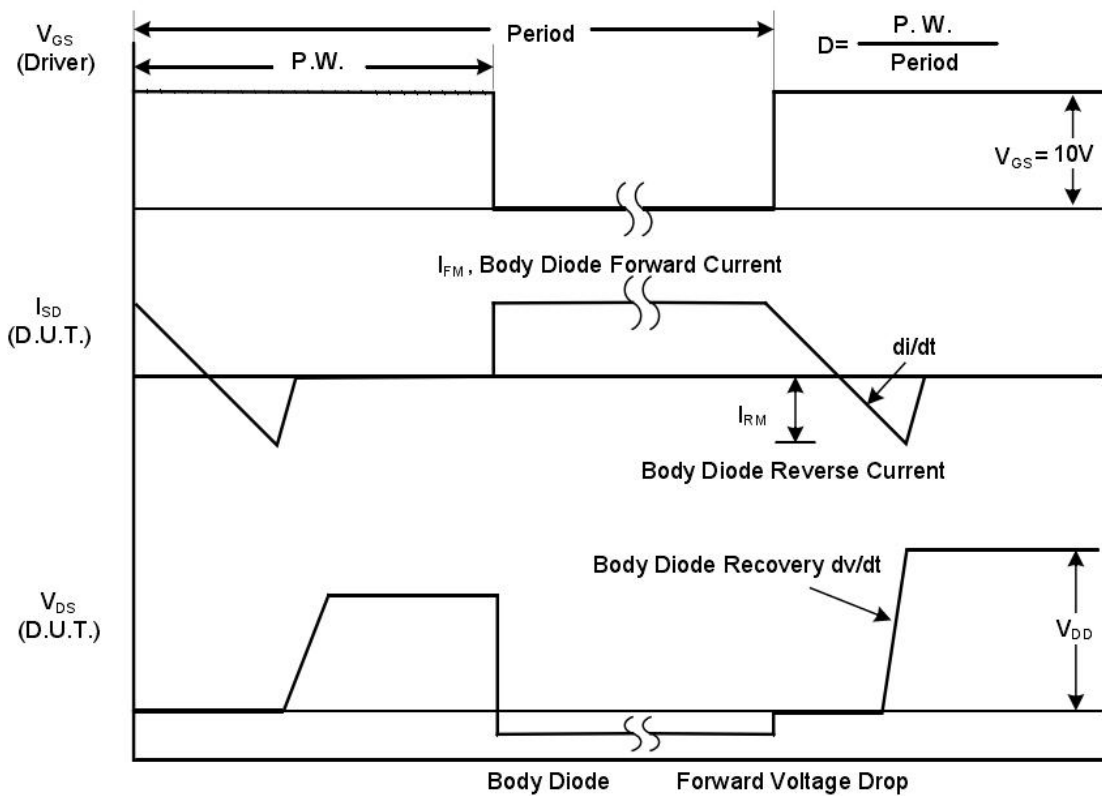
Notes

1. Repetitive Rating: pulse width limited by maximum junction temperature.
2. V_{DD}=50V, L=10mH, R_g=25 Ω, starting T_J=25°C.
3. I_{SD}=4A, dI/dt ≤ 100A/us, V_{DD} ≤ BV_{DSS}, starting T_J=25°C, Pulse width ≤ 300us; duty cycle ≤ 2%.
4. Repetitive rating; pulse width limited by maximum junction temperature.

TEST CIRCUIT AND WAVEFORM



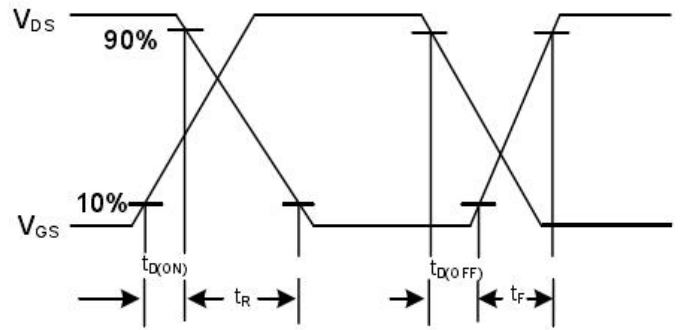
Peak Diode Recovery dv/dt Test Circuit



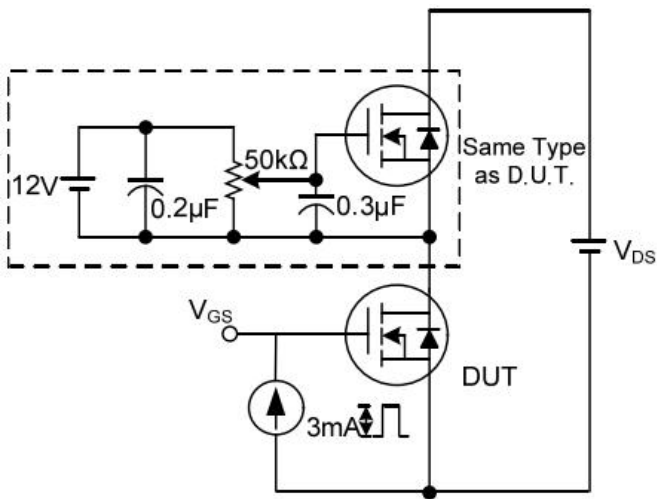
Peak Diode Recovery dv/dt Waveforms



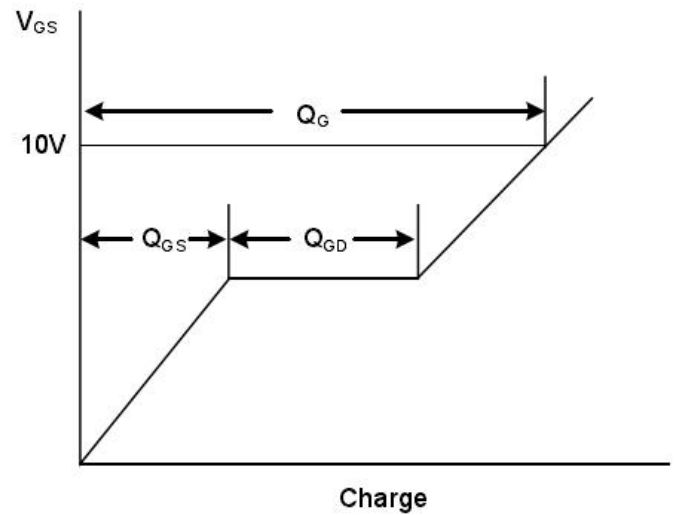
Switching Test Circuit



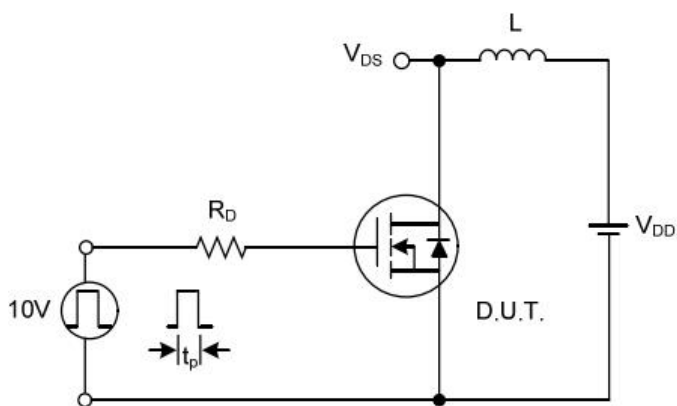
Switching Waveforms



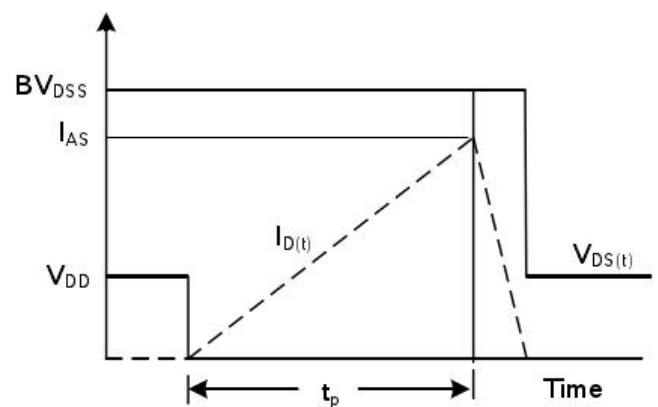
Gate Charge Test Circuit



Gate Charge Waveform

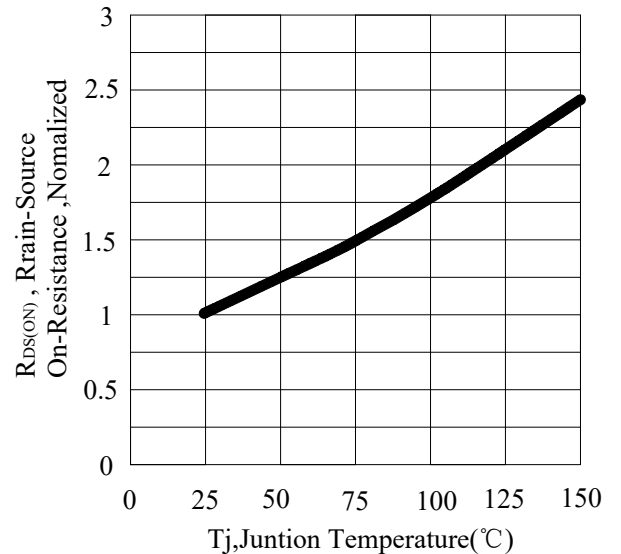
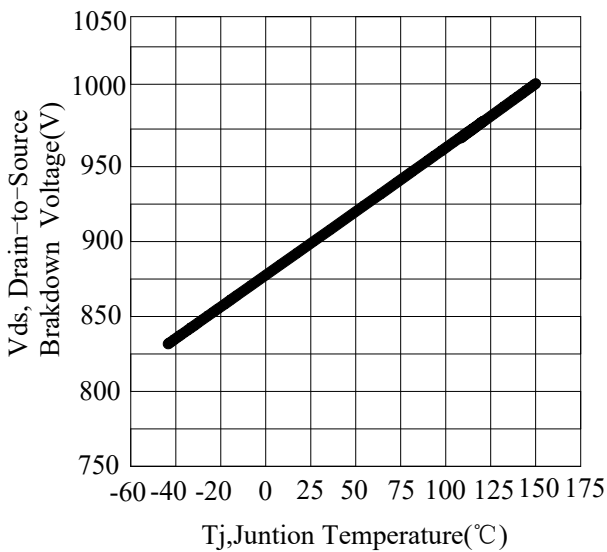
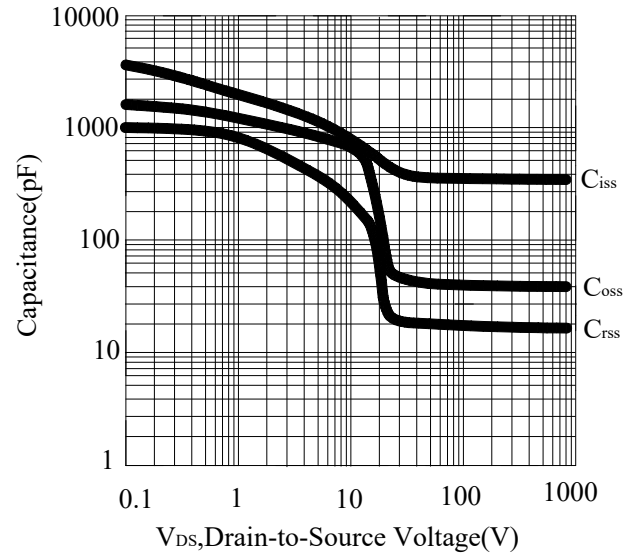
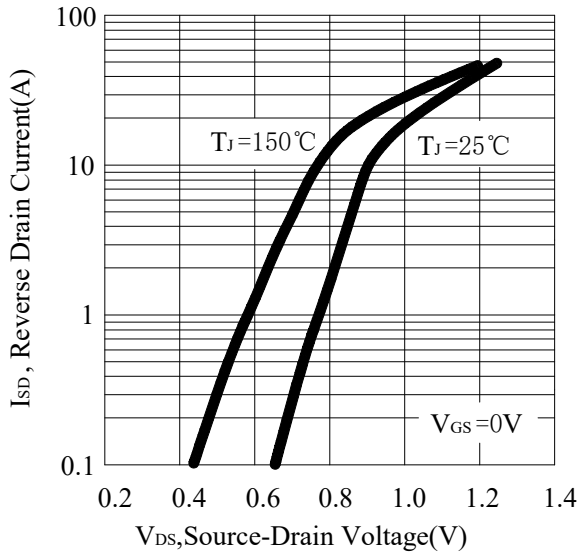
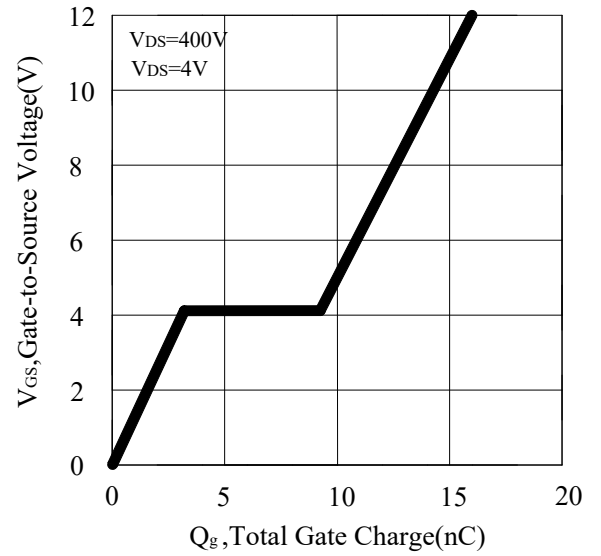
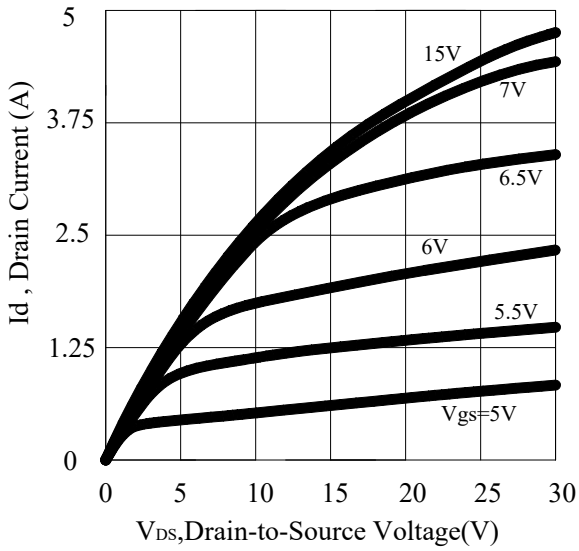


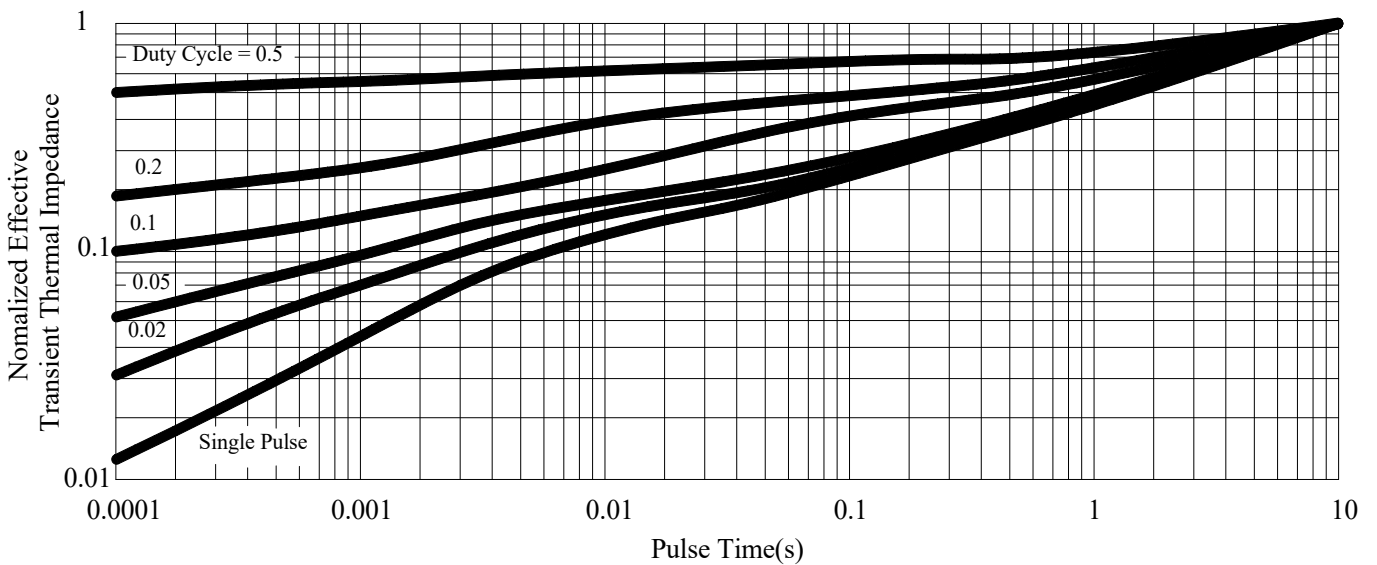
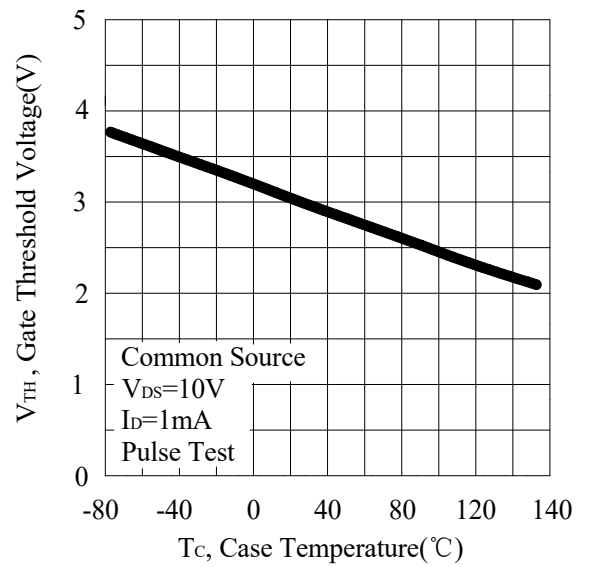
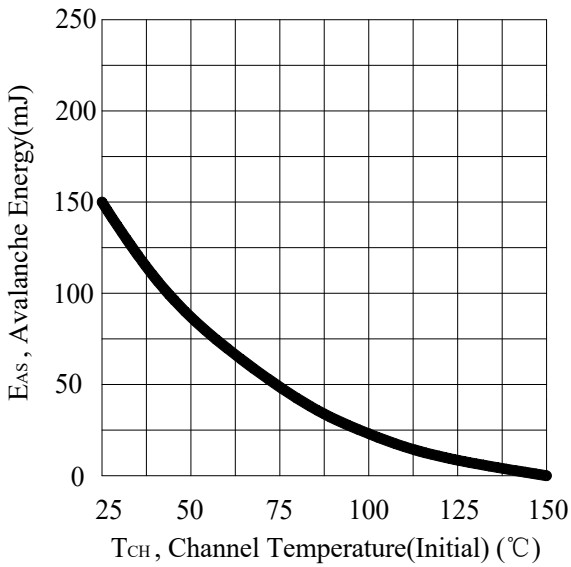
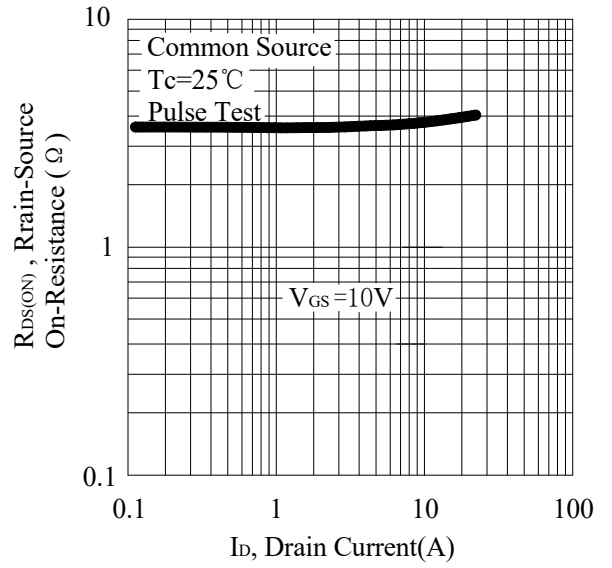
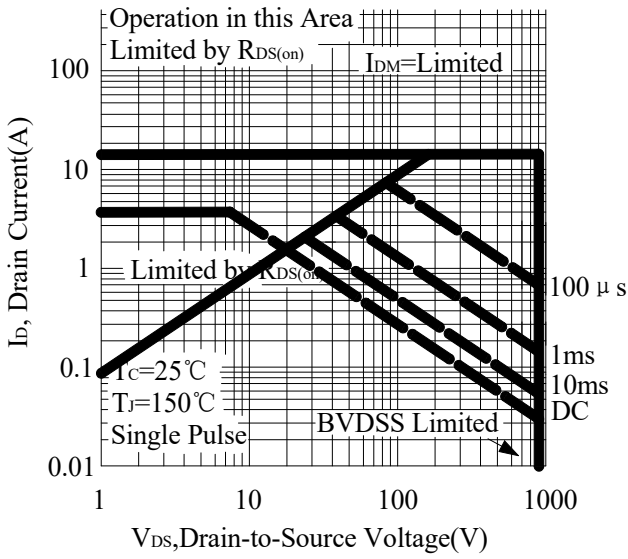
Unclamped Inductive Switching Test Circuit



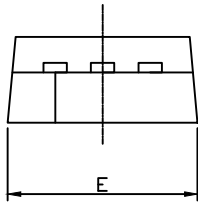
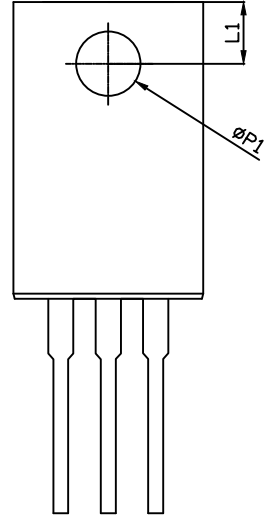
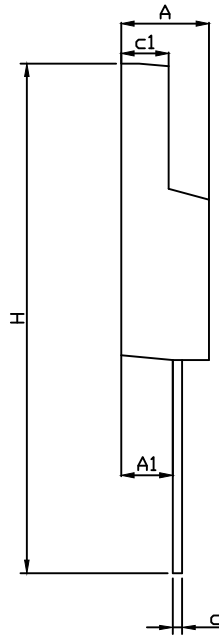
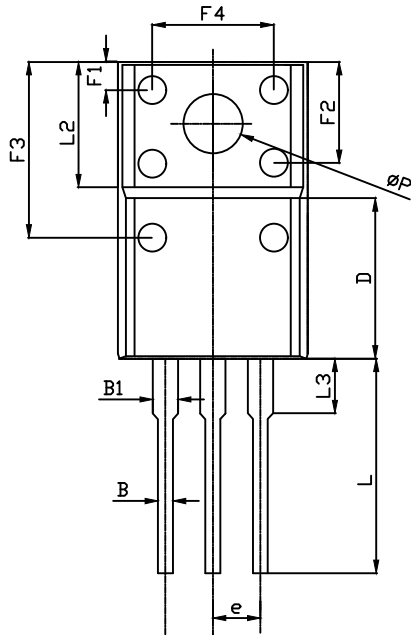
Unclamped Inductive Switching Waveforms

RATING AND CHARACTERISTIC CURVES

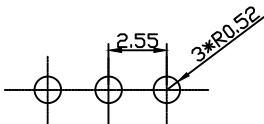




TO-220F-3L PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

	MIN	NOM	MAX
A	4.40	4.60	4.80
A1	2.63	2.76	2.89
B	0.75	0.80	0.90
B1	1.12	1.27	1.42
c	0.40	0.50	0.60
c1	2.60	2.70	2.80
D	7.50	7.80	8.10
e	-	2.55REF	-
E	9.86	10.00	10.10
F1	1.90	2.12	2.40
F2	5.00	5.30	5.65
F3	8.70	9.00	9.30
F4	6.20	6.50	6.80
H	27.80	28.30	28.80
L	13.10	13.30	13.50
L1	2.85	3.00	3.15
L2	-	6.70REF	-
L3	3.10	3.60	4.10
ΦP	3.00	3.30	3.60
ΦP1	2.80	3.10	3.40