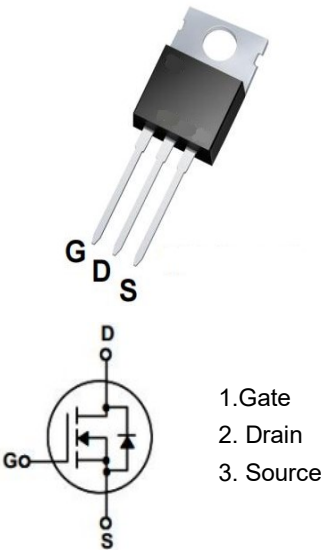




1.Features

- $R_{DS(ON)} \leq 5m\Omega$ @ $V_{GS}=10V$
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Advanced SGT process
- Lead free product is acquired

TO-220



2.Mechanical Data

- Case:Molded Plastic,TO-220;
- Epoxy:UL 94V-0 rate flame retardant
- Terminals:Plated Leads Solderable per MIL-STD-750,Method-2026.
- Marking: marked on body.
- Mounting Position : Any.

3.Maximum Ratings and Electrical Characteristics

Rating at 25°C Cambient temperature unless otherwise specified

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	100	V
Drain Current Continuous	$T_C=25^{\circ}C$	I_D	145	A
	$T_C=100^{\circ}C$		90	
Drain Current Pulsed(Note 1)		I_{DM}	580	A
Single Pulse Avalanche Energy		E_{AS}	136	mJ
Gate-Source Voltage		V_{GS}	± 20	V
Power Dissipation($T_C=25^{\circ}C$)		P_D	167	W
Maximum Junction Temperature		T_J	150	$^{\circ}C$
Storage Temperature Range		T_{stg}	-55 to +150	$^{\circ}C$
Thermal Resistance, Junction-to-Case		$R_{\theta JC}$	0.75	$^{\circ}C/W$
Thermal Resistance, Junction-to- Ambient		$R_{\theta JA}$	62	$^{\circ}C/W$



Characteristics	Symbol	Test conditions	Min	TYP	Max	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V,I _D =250μA	100	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 100V,V _{GS} = 0V	-	-	1	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = 20V	-	-	100	nA
Gate-Source Leakage Current		V _{GS} = -20V	-	-	-100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS (th)}	V _{GS} = V _{DS} , I _D =250μA	1.2	1.8	2.5	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =50A	-	4.3	5	mΩ
		V _{GS} =4.5V, I _D =50A	-	6	7.5	mΩ
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =50V	-	3722	-	pF
Output Capacitance	C _{OSS}	V _{GS} =0V	-	1235	-	
Reverse Transfer Capacitance	C _{rss}	f=1.0MHZ	-	33	-	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =50V, V _{GS} =50V R _G =10Ω; I _D =3A	-	25	-	ns
Turn-on Rise Time	t _r		-	23	-	
Turn-off Delay Time	t _{d(off)}		-	70	-	
Turn-off Fall Time	t _f		-	22	-	
Total Gate Charge	Q _g	V _{DS} =50V, V _{GS} =10A I _D =50A	-	64	-	nC
Gate-Source Charge	Q _{gs}		-	15	-	
Gate-Drain Charge	Q _{gd}		-	21	-	
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	I _S =20A,V _{GS} =0V	-	-	1.4	V
Continuous Source Current	I _S		-	-	145	A
Reverse Recovery Time	trr	IF=20A, di/dt=100A/μs	-	68	-	ns
Reverse Recovery Charge	Qrr		-	91	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Essentially independent of operating temperature



4. Rating And Characteristic Curves

Fig.1 Output Characteristics

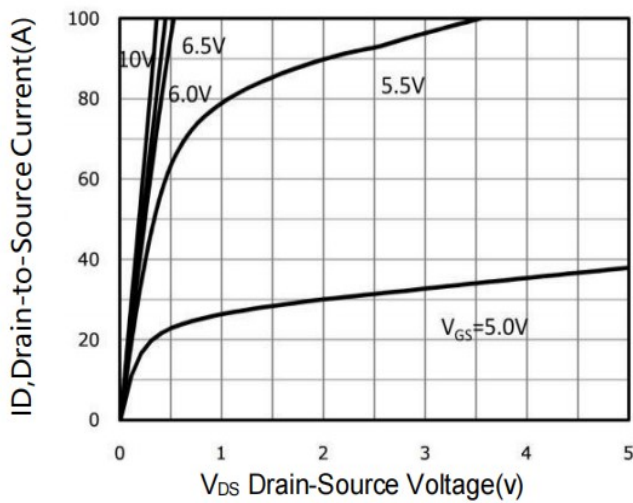


Fig.2 Transfer Characteristics

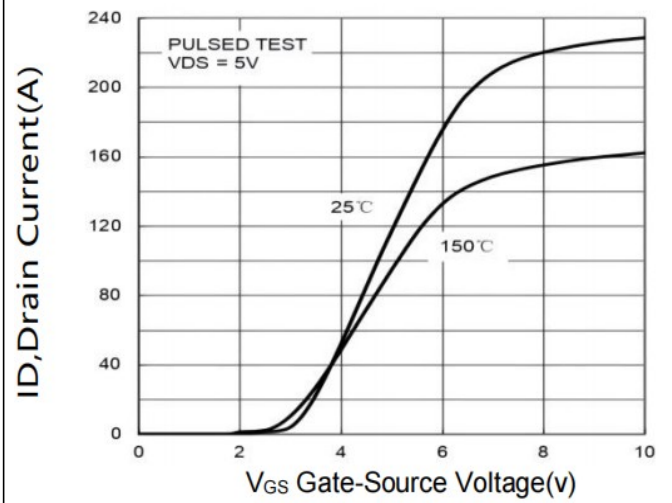


Fig.3 On-Resistance versus Drain Current

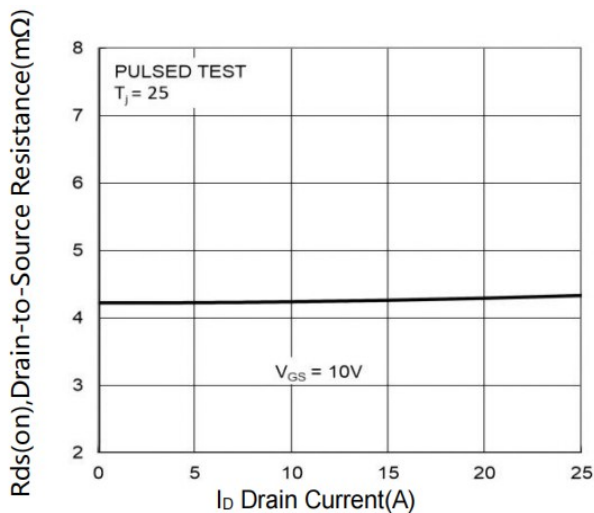


Fig.4 Diode forward voltage versus Current

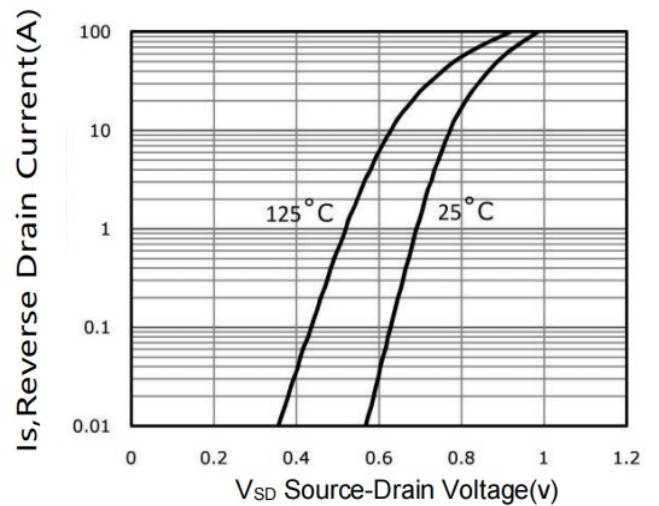


Fig.5 Typical Capacitance versus V_{DS}

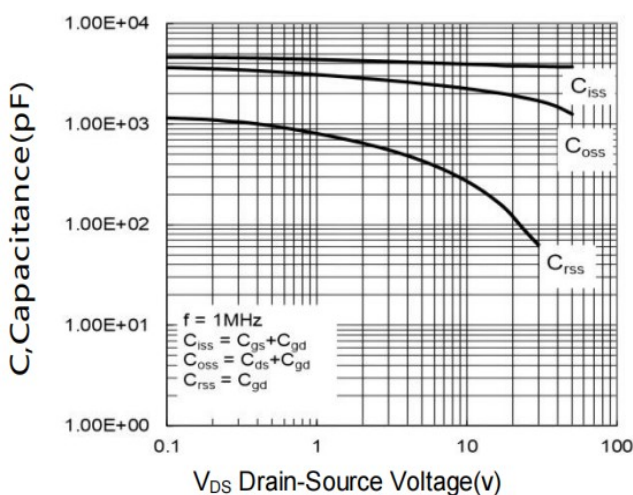


Fig.6 Source- Drain Diode Forward

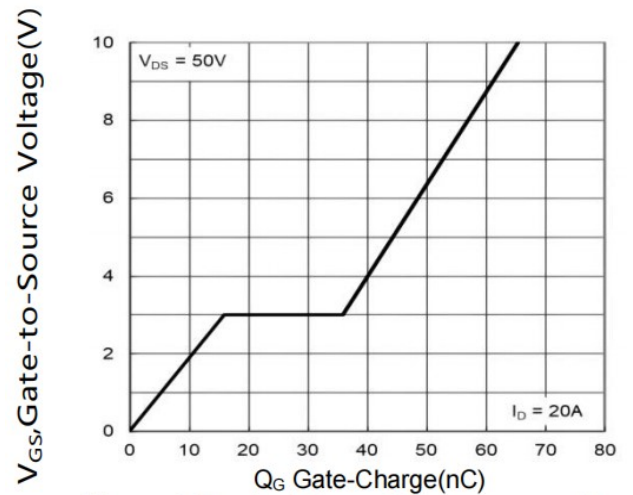




Fig.7 BV_{DSS} Variation with Temperature

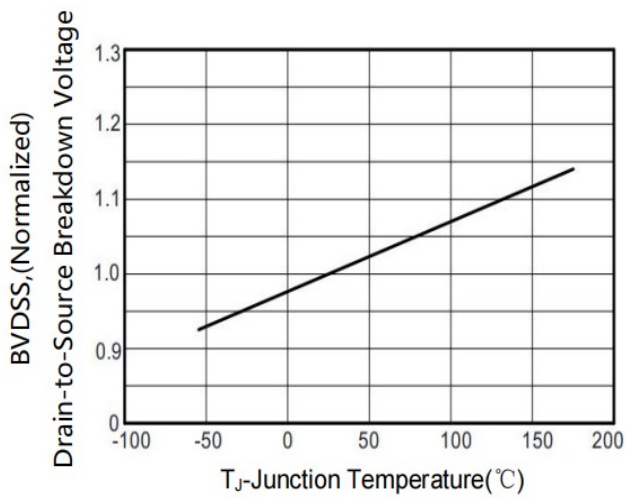


Fig.8 On-Resistance Variation with Temperature

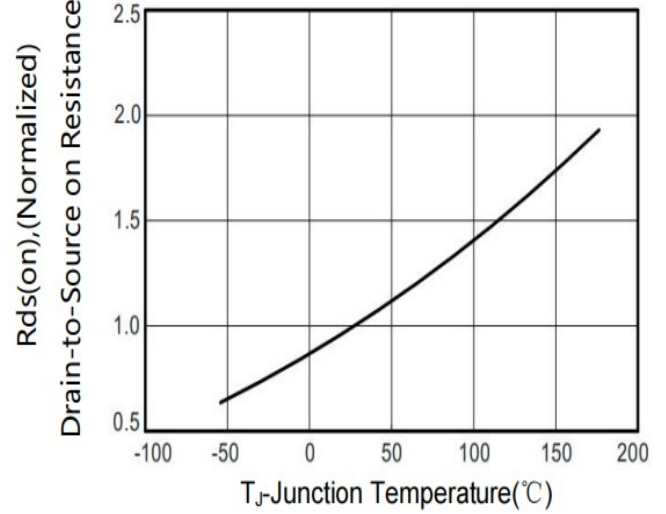


Fig.9 Maximum Safe Operating Area

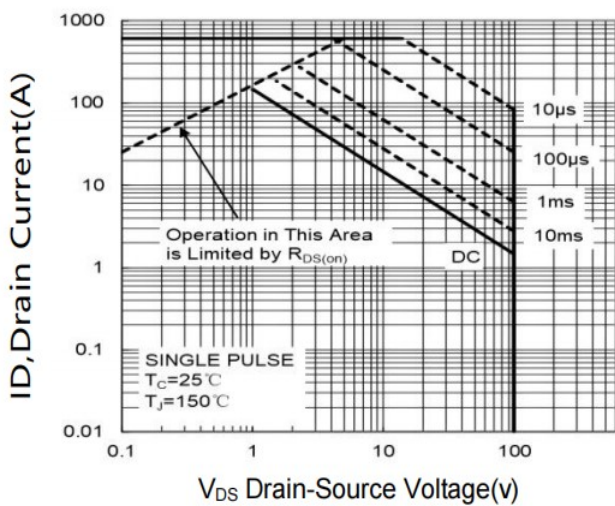
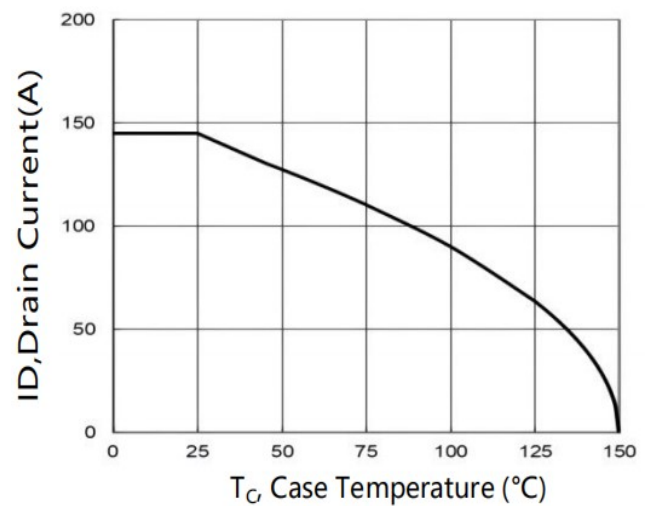


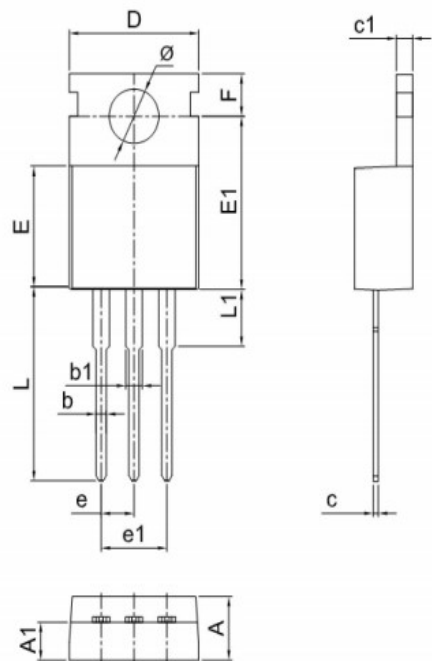
Fig 10 Continuous Drain Current vs Case Temperature





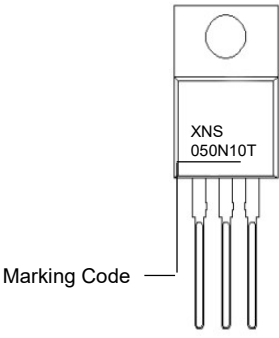
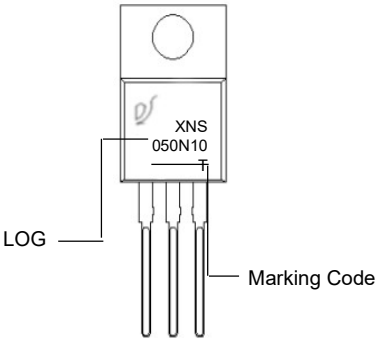
5.Dimensions

TO-220 Mechanical Drawing



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.169	0.181	4.30	4.60
A1	0.098	0.110	2.50	2.80
b	0.028	0.035	0.70	0.90
b1	0.047	0.059	1.20	1.50
c	0.012	0.024	0.30	0.60
c1	0.045	0.055	1.15	1.40
D	0.390	0.402	9.90	10.20
E	0.335	0.354	8.50	9.00
E1	0.472	0.492	12.00	12.50
e	0.094	0.104	2.40	2.65
e1	0.191	0.209	4.85	5.30
F	0.102	0.110	2.60	2.80
L	0.520	0.543	13.20	13.80
L1	0.150	0.165	3.80	4.20
Ø	0.142	0.157	3.60	4.00

6. Part Marking System

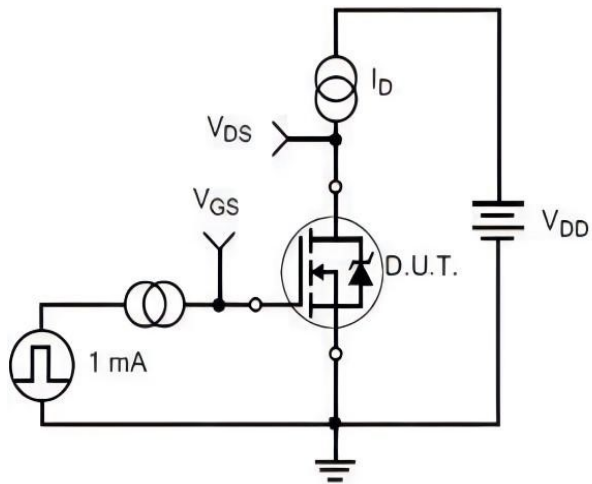


7. Package Information

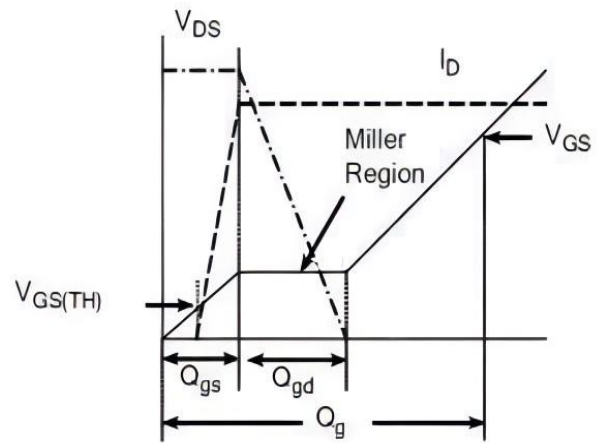
Package	Packing Type	Quantity(pcs)
TO-220	Tube	50



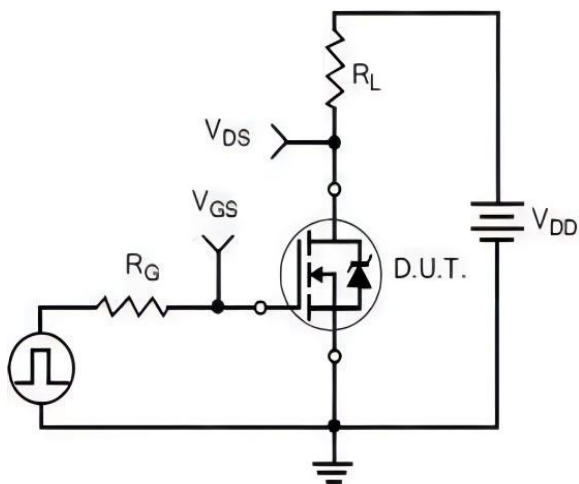
8. Test circuits



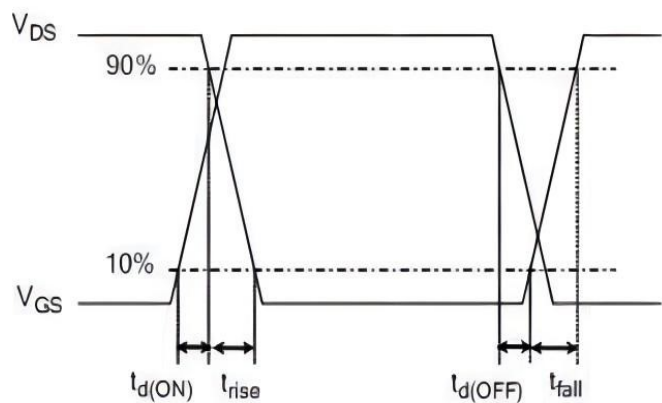
Gate Charge Test Circuit



Gate Charge Waveform



Resistive Switching Test Circuit



Resistive Switching Waveforms



The diagram shows a circuit for testing a Device Under Test (D.U.T.). A DC voltage source V_{DD} is connected to the positive terminal of an inductor L . The negative terminal of L is connected to ground. A MOSFET, labeled "Current Pump", has its source connected to ground and its gate connected to a "di/dt adj." potentiometer. The drain of the Current Pump MOSFET is connected to the positive terminal of the D.U.T. MOSFET. The D.U.T. MOSFET has its source connected to ground and its gate connected to a "Double Pulse" source. The drain of the D.U.T. MOSFET is connected to the negative terminal of the inductor L . The current through the inductor is labeled I_D .

Timing diagram showing the relationship between the drain voltage BV_{DSS} and the gate voltage V_{GS} during a switching event.

The diagram illustrates the transition time t_{AV} (the time interval during which the drain voltage is falling) and the peak current I_{AS} (the maximum current during the transition).

The energy dissipation during the transition is given by the formula:

$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

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