

POWER MOSFET

$$I_D = 13A$$

$$V_{DS} = 500V$$

$$R_{DS(on)MAX} = 0.48\Omega$$

Major Ratings and Characteristics

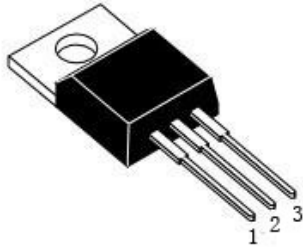
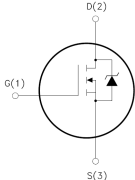
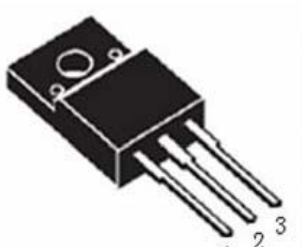
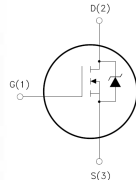
Characteristics	Values	Units
I_D	13	A
I_{DM}	50	A
V_{DS}	500	V
V_{GS}	± 30	V
T_J	150	$^{\circ}C$
T storage	-55 ~ 150	$^{\circ}C$

Description/ Features

The MFIRF13N50 is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150 $^{\circ}C$ Tj operation
- Low Power Loss & Low cost
- Fast Switching
- RoHS Compliant

Case Styles

  1、 GATE 2、 DRAIN 3、 SOURCE	  1、 GATE 2、 DRAIN 3、 SOURCE
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Ordering Information

Part Number	Package	Packaging
MCIRF13N50	TO-220	Tube
MFIRF13N50	TO-220F	Tube

MFIRF13N50

MCIRF13N50

Absolute Maximum Rating ($T_{amb}=25^{\circ}\text{C}$)

Parameter	Symbol	Value		Unit
Drain-Source Voltage	V_{DS}	500		V
Gate-Source Voltage	V_{GS}	± 30		V
Drain Current-Pulsed	I_{DM}	50		A
Total Dissipation	P_D	TO-220	190	W
		TO-220F	48	
Junction Temperature	T_J	150		$^{\circ}\text{C}$
Storage Temperature	$T_{stg.}$	$-55\sim 150$		$^{\circ}\text{C}$
Single Pulse Avalanche Energy	E_{AS}	TO-220	750	mJ
		TO-220F	750	

Electrical Characteristics($T_{amb}=25^{\circ}\text{C}$)

Characteristic	Symbol	Test Condition	MIN.	MAX.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	500	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	4	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$	-	10	μA
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_D=13A$	-	1.5	V
Forward Trans conductance	G_{fs}	$V_{DS}=10V, I_D=6.5A$	6	-	S
Gate-Body Leakage Current($V_{ds}=0V$)	I_{GSS}	$V_{GS}=\pm 30V$	-	± 100	nA
Static Drain-Source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=6.5A$	-	0.48	Ω
Thermal Resistance Junction-Case	R_{thJ-C}	TO-220	-	2	$^{\circ}\text{C/W}$
		TO-220F	-	2.5	

Dynamic Characteristics($T_{amb}=25^{\circ}\text{C}$)

Characteristic	Symbol	Test Condition	MIN.	TYP.	MAX.	Unit
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	1960	2450	pF
Output Capacitance	C_{OSS}		-	190	237	pF
Reverse Transfer Capacitance	C_{RSS}		-	23	29	pF



Switching Characteristics(Tamb=25°C)

Characteristic	Symbol	Test Condition	MIN.	TYP.	MAX.	Unit
Turn-On Delay Time	Td(on)	$V_{DD}=250V, I_D=13.0A,$ $R_G=25\Omega$	-	25	-	nS
Turn-On Rise Time	Tr		-	100	-	nS
Turn-Off Delay Time	Td(off)		-	130	-	nS
Turn-Off Rise Time	Tf		-	100	-	nS
Total Gate Charge	Qg	$V_{DS}=400V, I_D=13.0A,$ $V_{GS}=10V$	-	36	45	nC
Gate-Source Charge	Qgs		-	8.3	-	nC
Gate-Drain Charge	Qgd		-	9.8	-	nC

Drain-Source Diode Maximum Ratings And Characteristics(Tamb=25°C)

Characteristic	Symbol	Test Condition	MIN.	TYP.	MAX.	Unit
Max. Diode Forward Current	Is		-	-	13	A
Max. Pulsed Forward Current	ISM		-	-	52	A
Diode Forward Voltage	VSD	$V_{GS}=0V, I_S=13.0A,$	-	-	1.5	V
Reverse Recovery Time	Trr	$V_{GS}=0V, I_S=13.0A,$ $dI_F/dt=100A/\mu S$	-	410	-	nS
Reverse Recovery Charge	Qrr		-	4.5	-	uC

MFIRF13N50

MCIRF13N50

Characteristics Curve

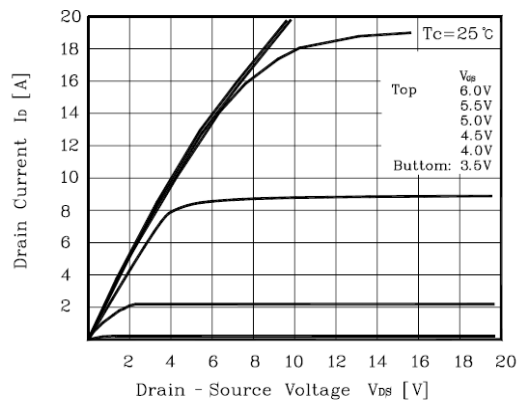


Figure1.Output Characteristic

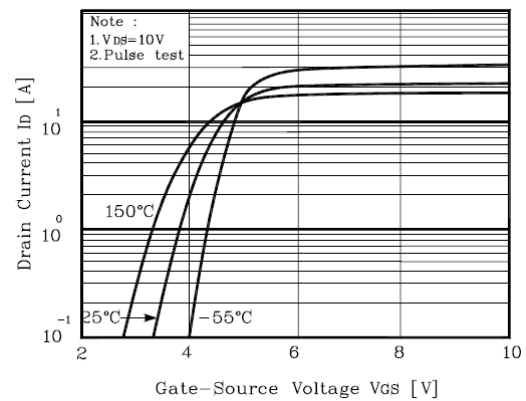


Figure2.Transfer Characteristic

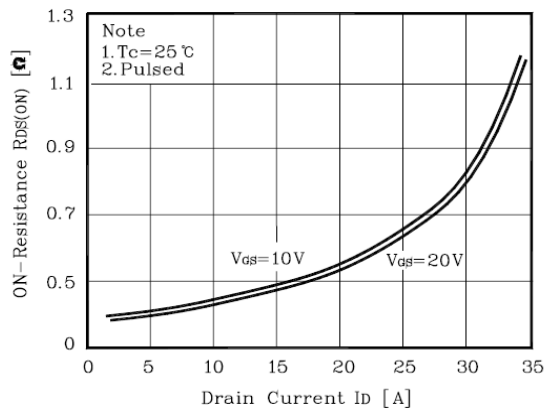


Figure3.On Resistance Vs Drain Current

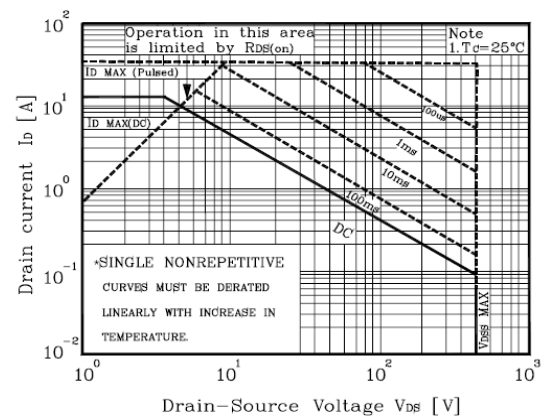


Figure4.Safe Operating Area

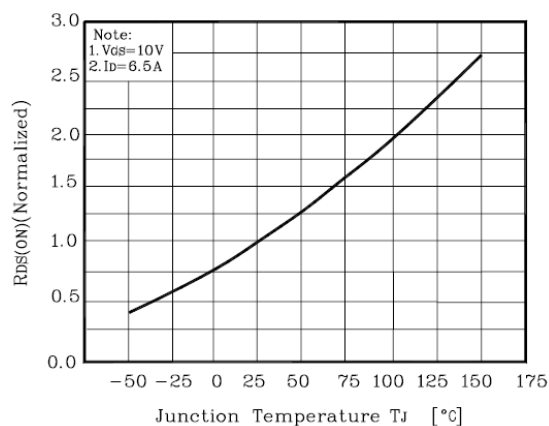


Figure5.On Resistance Vs Junction Temperature

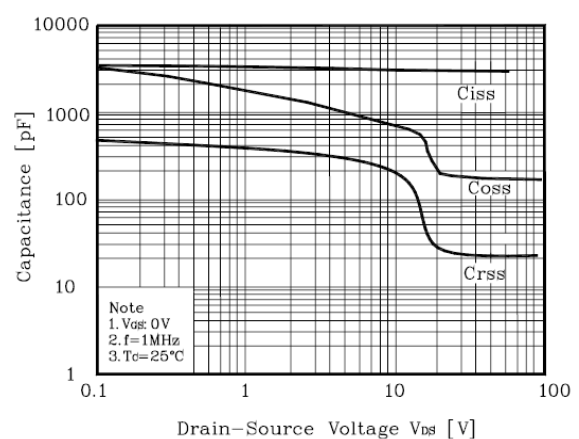


Figure6.Capacitance

Characteristics Curve

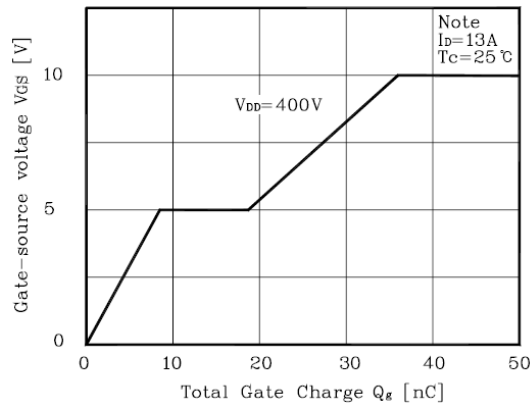


Figure7.Gate Charge Waveform

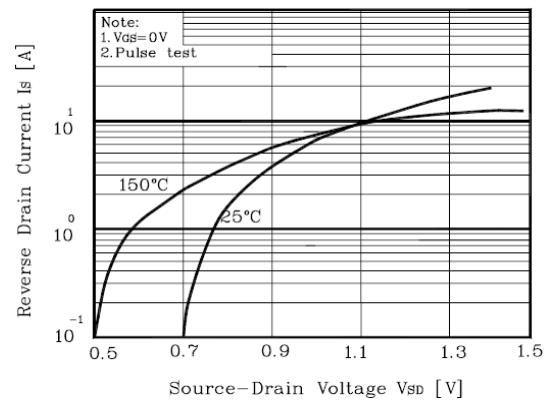


Figure8.Source-Drain Diode Forward Voltage

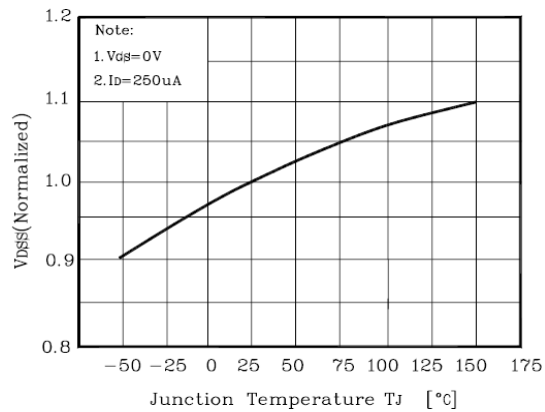


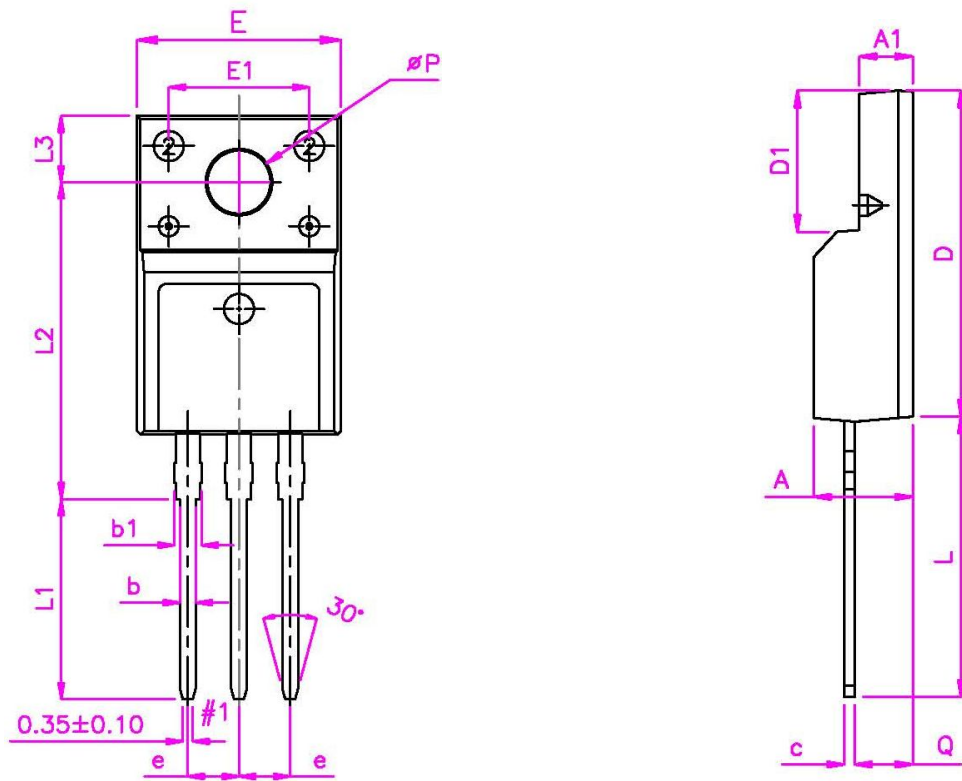
Figure9.Breakdown Voltage Vs Junction Temperature

MFIRF13N50
MCIRF13N50

TO-220F Mechanical Data

UNIT.: mm

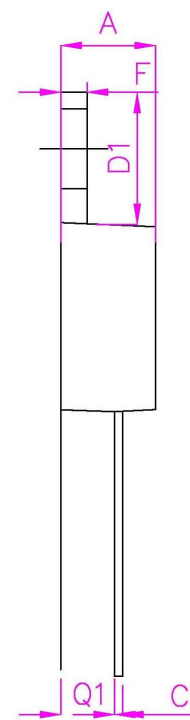
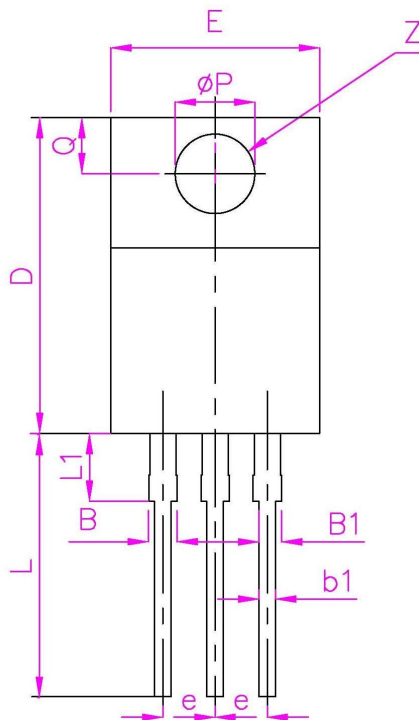
Symbol	MIN.	NOM.	MAX.	Symbol	MIN.	NOM.	MAX.
A	4.2	-	4.70	E1	-	7.0	-
A1	2.30	-	2.90	e	-	2.54	-
b	0.45	-	0.9	L	12.5	-	14.3
b1	1.1	-	1.7	L1	9.45	-	10.05
c	0.35	-	0.9	L2	15	-	16
D	14.5	-	17	L3	3.2	-	4.4
D1	6.10	-	9.0	ΦP	3.0	-	3.3
E	9.6	-	10.3	Q	2.5	-	2.90



TO-220 Mechanical Data

UNIT.: mm

Symbol	MIN.	NOM.	MAX.	Symbol	MIN.	NOM.	MAX.
A	4.0	-	4.80	E	9.90	-	10.70
B	1.20	-	1.40	e	-	2.54	-
B1	1.0	-	1.30	F	1.10	-	1.40
b1	0.65	-	1.00	L	12.50	-	14.50
c	0.40	-	0.55	L1	3.00	3.50	4.00
D	15.0	-	16.5	Q	2.50	-	3.00
D1	5.90	-	6.90	Q1	2.00	-	2.90
				P	-	3.80	-



Data and specifications subject to change without notice.

This product has been designed and qualified for Industrial Level and Lead-Free.

Qualification Standards can be found on GS's Web site.

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