

POWER MOSFET

$$I_D = 4A$$

$$V_{DS} = 650V$$

$$R_{DS(on)MAX} = 2.3\Omega$$

Description/ Features

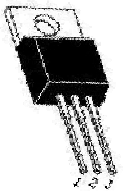
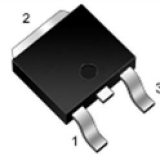
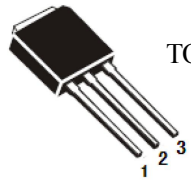
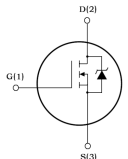
The MCIRF4N65 is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150°C Tj operation
- Low Power Loss & Low cost
- Fast Switching
- RoHS Compliant

Major Ratings and Characteristics

Characteristics	Values	Units
I_{DS}	4	A
I_{DM}	16	A
V_{DS}	650	V
V_{GS}	± 30	V
T_J	150	°C
T storage	-55 ~ 150	°C

Case Styles

 TO-220	 TO-220F	 TO-252	 TO-251
			
1、 GATE 2、 DRAIN 3、 SOURCE			

Ordering Information

Part Number	Package	Packaging
MCIRF4N65	TO-220	Tube
MFIRF4N65	TO-220F	Tube
MJIRF4N65	TO-251	Tube
MKIRF4N65	TO-252	Tube & Tape & Reel

MCIRF4N65 MFIRF4N65
MKIRF4N65 MJIRF4N65

Absolute Maximum Rating (Tamb = 25°C)

Parameter	Symbol	Value		Unit
Drain-Source Voltage	V_{DS}	650		V
Gate-Source Voltage	V_{GS}	± 30		V
Drain Current-Pulsed	I_{DM}	16		A
Total Dissipation	P_D	TO-220	70	W
		TO-220F	30	
		TO-251	50	
		TO-252	50	
Junction Temperature	T_J	150		°C
Storage Temperature	T_{stg}	-55~150		°C
Single Pulse Avalanche Energy	E_{AS}	280		mJ

Electrical Characteristics(Tamb=25°C)

Characteristics	Symbol	Test Condition	MIN.	MAX.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	-	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}	$V_{DS}=650V, V_{GS}=0V$	-	10	μA
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=4A$	-	1.4	V
Forward Trans conductance	G_{fs}	$V_{DS}=10V, I_D=2.0A$	1.5	-	S
Gate-Body Leakage Current($V_{ds}=0V$)	I_{GSS}	$V_{GS}=\pm 30V$	-	± 100	nA
Static Drain-Source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.0A$	-	2.3	Ω
Thermal Resistance Junction-Case	R_{thJ-C}	TO-220	-	2	°C/W
		TO-220F	-	2.5	
		TO-251	-	2.32	
		TO-252	-	2.32	

Dynamic Characteristics(Tamb=25°C)

Characteristics	Symbol	Test Condition	MIN.	TYP.	MAX.	Unit
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$	-	558	720	pF
Output Capacitance	C_{OSS}		-	62	85	pF
Reverse Transfer Capacitance	C_{RSS}		-	7	10	pF



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

Characteristics	Symbol	Test Condition	MIN.	TYP.	MAX.	Unit
Turn-On Delay Time	$T_{d(on)}$	$V_{DS}=300\text{V}, I_D=4.0\text{A},$ $R_G=25\Omega$	-	20	40	nS
Turn-On Rise Time	T_r		-	30	70	nS
Turn-Off Delay Time	$T_{d(off)}$		-	60	100	nS
Turn-Off Rise Time	T_f		-	35	85	nS
Total Gate Charge	Q_g	$V_{DS}=480\text{V}, I_D=4.0\text{A},$ $V_{GS}=10\text{V}$	-	20	40	nC
Gate-Source Charge	Q_{gs}		-	3	-	nC
Gate-Drain Charge	Q_{gd}		-	7	-	nC

Drain-Source Diode Maximum Ratings And Characteristics($T_{amb}=25^{\circ}\text{C}$)

Characteristics	Symbol	Test Condition	MIN.	TYP.	MAX.	Unit
Max. Diode Forward Current	I_S		-	-	4	A
Max. Pulsed Forward Current	I_{SM}		-	-	16	A
Diode Forward Voltage	V_{SD}		-	-	1.4	V
Reverse Recovery Time	T_{rr}	$V_{DS}=480\text{V}, I_D=4.0\text{A},$ $V_{GS}=10\text{V}$	-	320	-	nS
Reverse Recovery Charge	Q_{rr}		-	2.5	-	uC

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Characteristics Curve

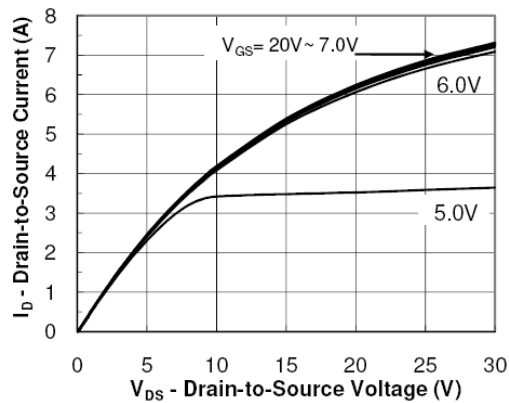


Figure1.Output Characteristic

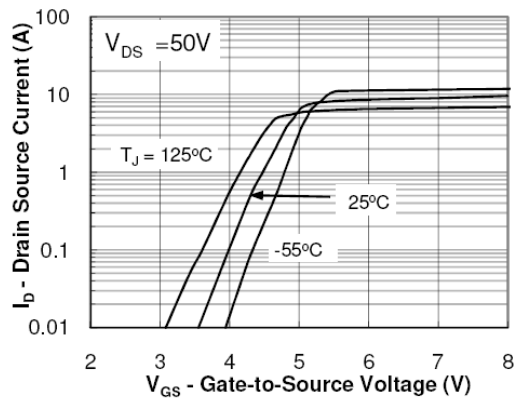


Figure2.Transfer Characteristic

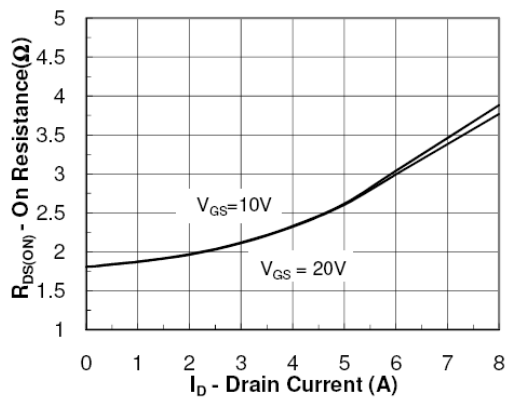


Figure3.On Resistance Vs Drain Current

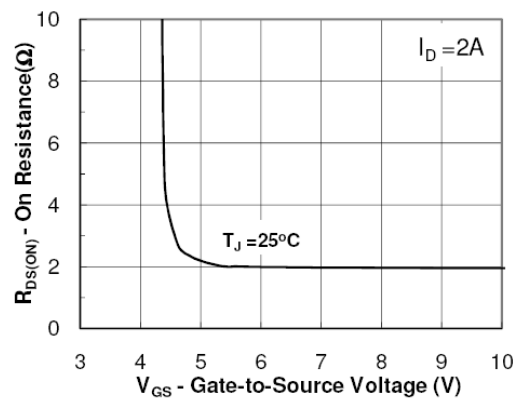


Figure4.On Resistance Vs Gate Source Voltage

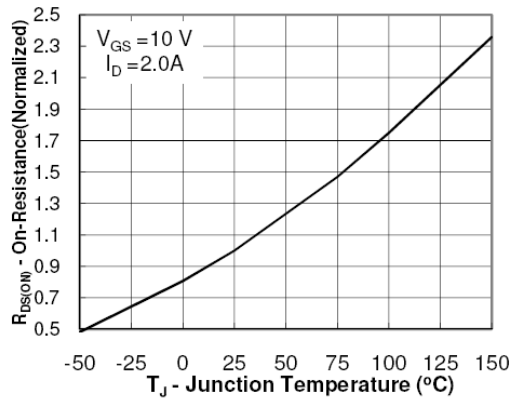


Figure5.On Resistance Vs Junction Temperature

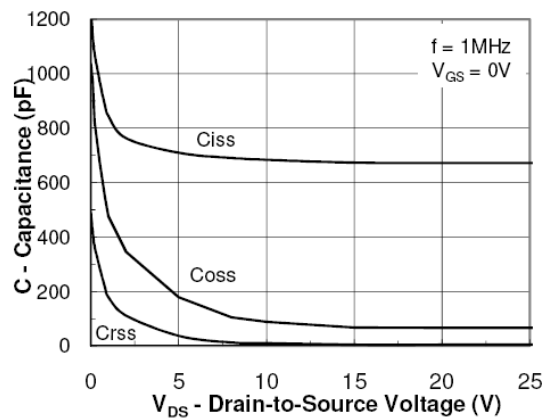


Figure6.Capacitance

Characteristics Curve

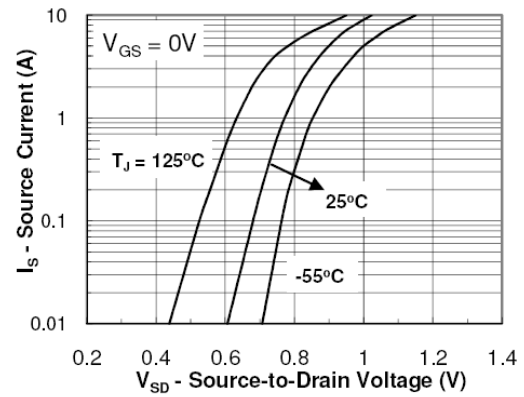
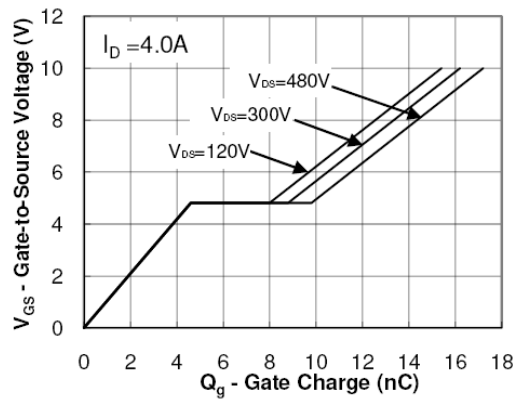


Figure7. Gate Charge Waveform

Figure8. Source-Drain Diode Forward Voltage

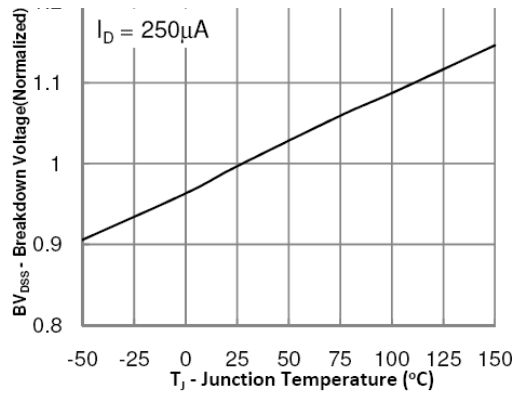


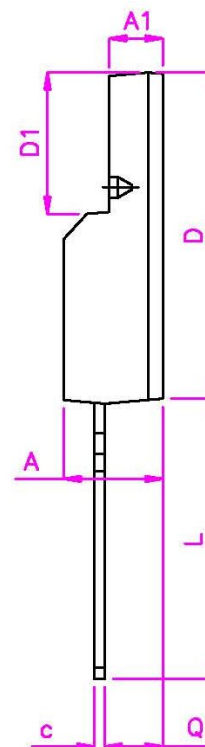
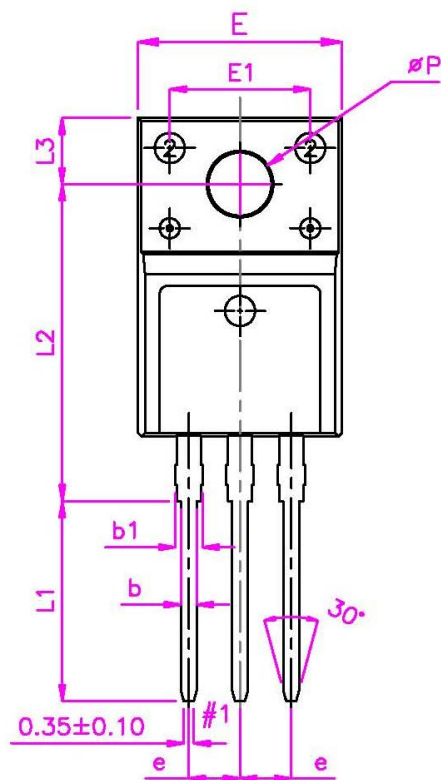
Figure9. Breakdown Voltage Vs Junction

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TO-220F Mechanical Data

UNIT.: mm

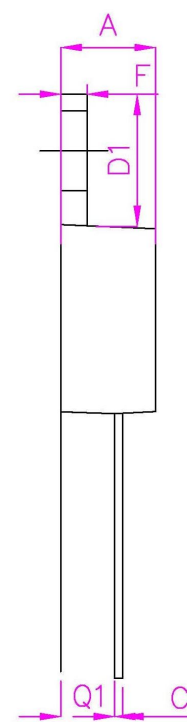
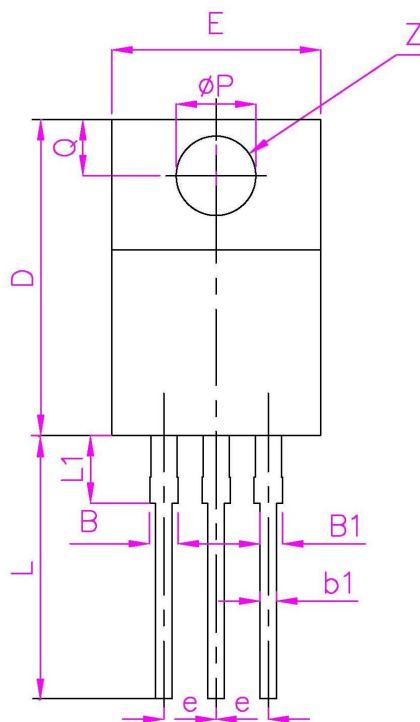
Symbol	MIN.	NOM.	MAX.	Symbol	MIN.	NOM.	MAX.
A	4.2	-	4.70	E1	-	7.0	-
A1	2.30	-	2.90	e	-	2.54	-
b	0.45	-	0.9	L	12.5	-	14.3
b1	1.1	-	1.7	L1	9.45	-	10.05
c	0.35	-	0.9	L2	15	-	16
D	14.5	-	17	L3	3.2	-	4.4
D1	6.10	-	9.0	ΦP	3.0	-	3.3
E	9.6	-	10.3	Q	2.5	-	2.90



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	-

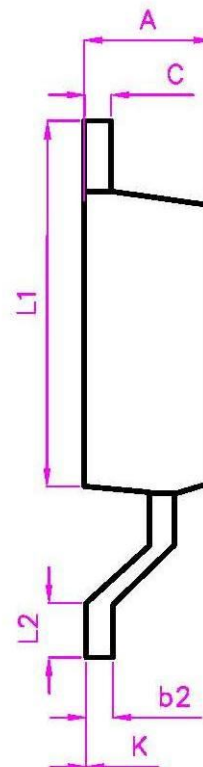
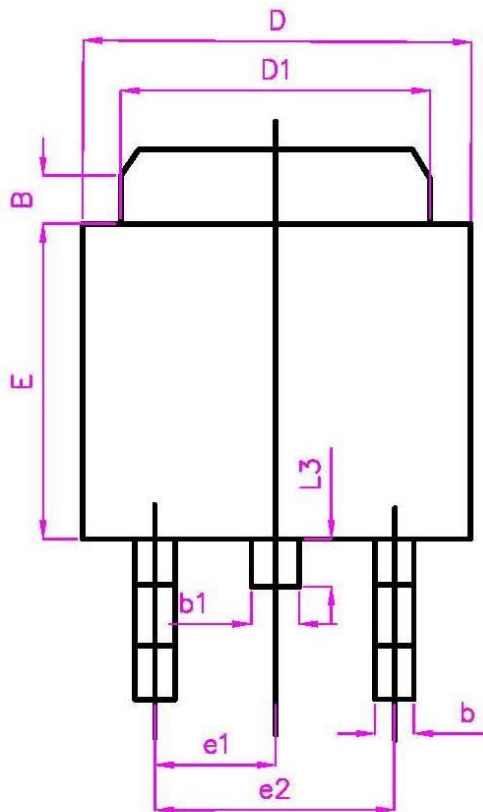


MCIRF4N65 MFIRF4N65
MKIRF4N65 MJIRF4N65

TO-252 Mechanical Data

UNIT.: mm

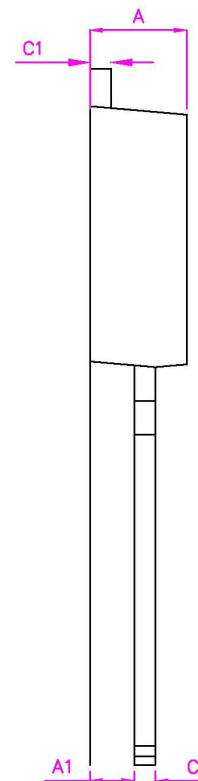
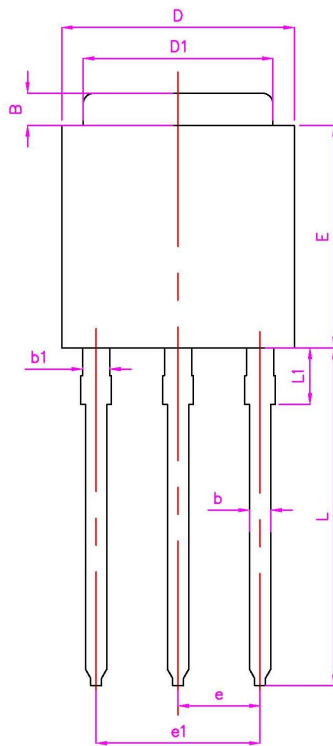
Symbol	MIN.	NOM.	MAX.	Symbol	MIN.	NOM.	MAX.
A	2.10	-	2.50	E	5.30	-	6.30
B	0.85	-	1.25	e1	2.25	-	2.35
b	0.50	-	0.80	e2	4.45	-	4.75
b1	0.50	-	0.90	L1	9.20	-	10.60
b2	0.45	-	0.70	L2	0.90	-	1.75
C	0.45	-	0.70	L3	0.60	-	1.10
D	6.30	-	6.75	K	-0.1	-	0.10
D1	5.10	-	5.50				



TO-251 Mechanical Data

UNIT.: mm

Symbol	MIN.	NOM.	MAX.	Symbol	MIN.	NOM.	MAX.
A	2.10	-	2.50	D1	5.10	-	5.50
A1	0.95	-	1.30	E	5.30	-	6.30
B	0.80	-	1.25	e	-	2.30	-
b	0.50	-	0.80	L	7.00	-	9.20
b1	0.70	-	0.90	L1	1.45	-	1.95
c	0.45	-	0.70	R	-	0.30	-
C1	0.45	-	0.70				
D	6.35	-	6.80				



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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