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IRFR220N(MS)

Product specification

DESCRIPTION

The IRFR220N(MS) uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

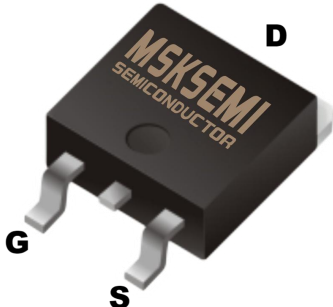
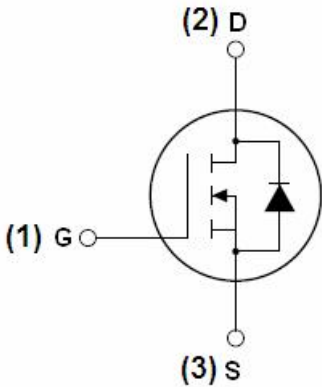

General Features

- $V_{DS} = 200V, I_D = 8A$
 $R_{DS(ON)} < 300m\Omega @ V_{GS} = 10V$ (Typ: 260m Ω)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Low gate to drain charge to reduce switching losses

Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Reference News

PACKAGE OUTLINE	Schematic Diagram	Marking
		 <p>Notes :XXX represents the order code</p>

Absolute Maximum Ratings ($T_c = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	8	A
Drain Current-Continuous($T_c = 100^\circ C$)	$I_D(100^\circ C)$	5.6	A
Pulsed Drain Current	I_{DM}	20	A
Maximum Power Dissipation	P_D	55	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	2.3	$^\circ C/W$
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Electrical Characteristics (TC=25°C unless otherwise noted)

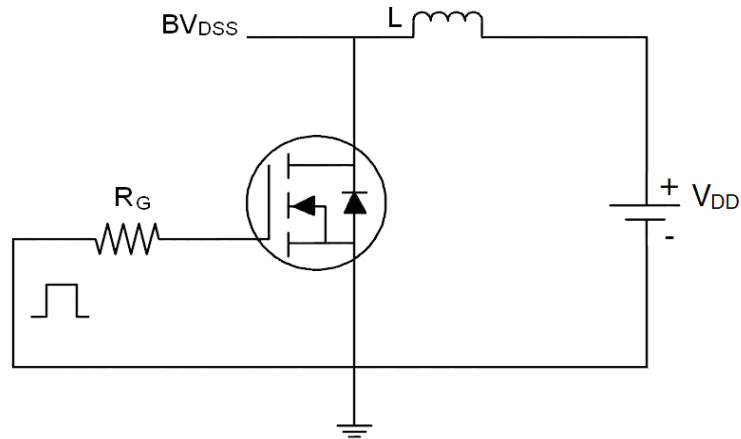
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage $V_{GS}=0V, I_D=250\mu A$			200	215	-	V
Zero Gate Voltage Drain Current $V_{DS}=200V, V_{GS}=0V$			-	-	1	μA
Gate-Body Leakage Current $V_{GS}=\pm 20V, V_{DS}=0V$			-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage $V_{DS}=V_{GS}, I_D=250\mu A$			1	1.7	2.5	V
Drain-Source On-State Resistance $V_{GS}=10V, I_D=4.5A$			-	260	300	m Ω
Forward Transconductance $V_{DS}=25V, I_D=4.5A$			3	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0$ $V, F=1.0MHz$		540		PF
Output Capacitance	C_{oss}			90		PF
Reverse Transfer Capacitance	C_{rss}			35		PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=100V, I_D=4.5$ A $V_{GS}=10V, R_{GEN}=5$ Ω	-	6.4	-	nS
Turn-on Rise Time	t_r		-	11	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	20	-	nS
Turn-Off Fall Time	t_f		-	12	-	nS
Total Gate Charge	Q_g	$V_{DS}=160V, I_D=4.5$ A, $V_{GS}=10V$	-	16	-	nC
Gate-Source Charge	Q_{gs}		-	3.4	-	nC
Gate-Drain Charge	Q_{gd}		-	5.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=8A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	8	A

Notes:

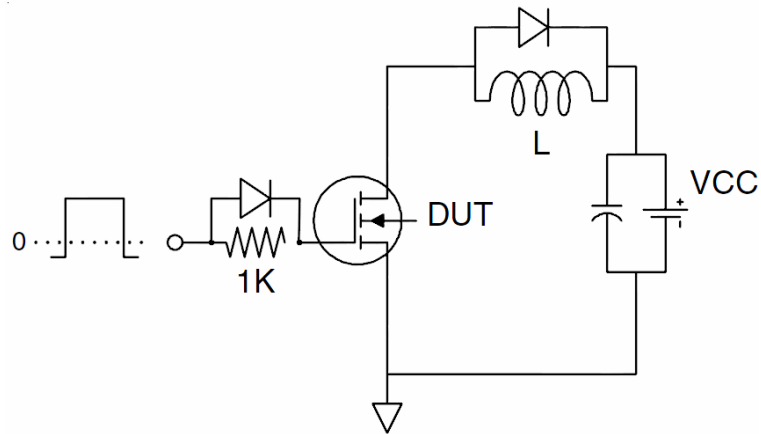
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

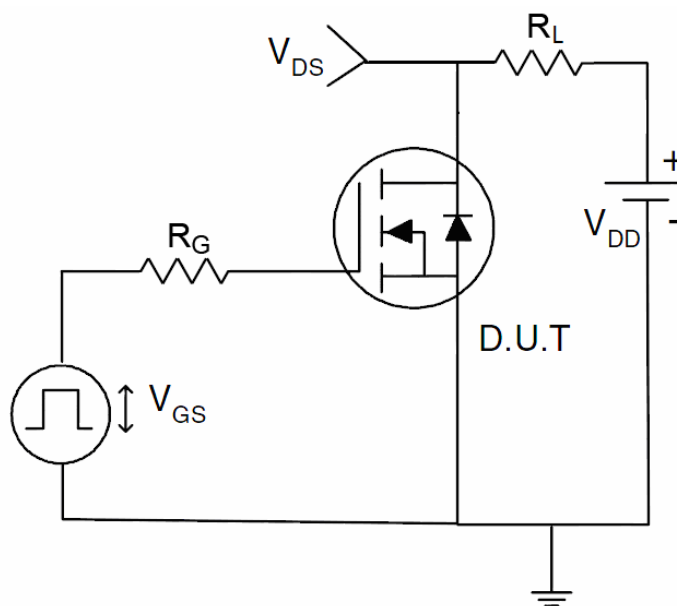
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

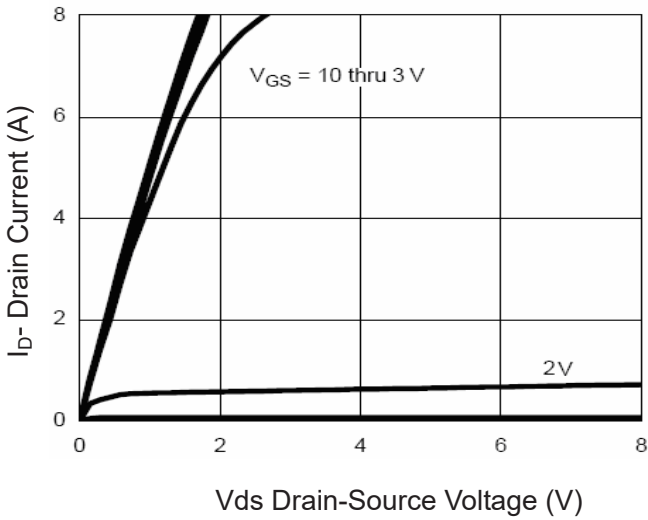


Figure 1 Output Characteristics

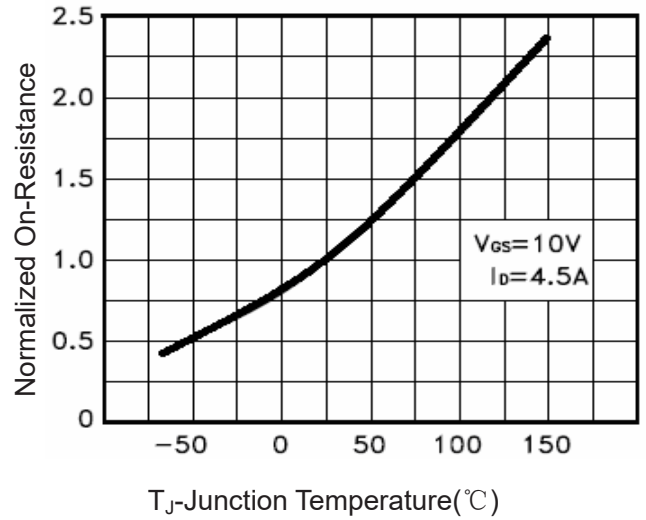


Figure 4 Rdson-Junction Temperature

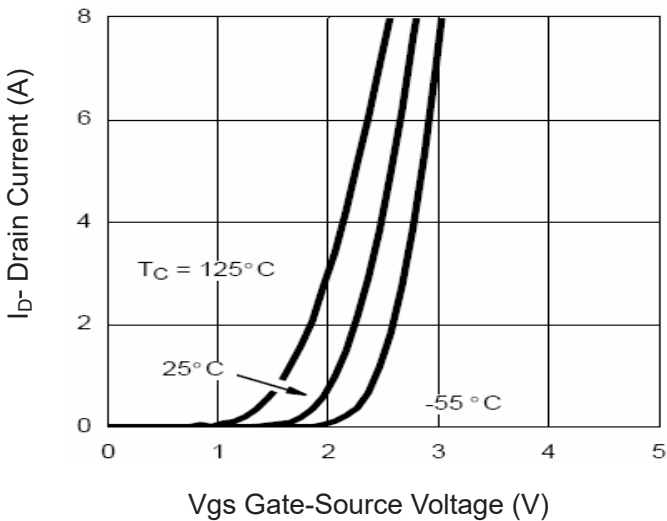


Figure 2 Transfer Characteristics

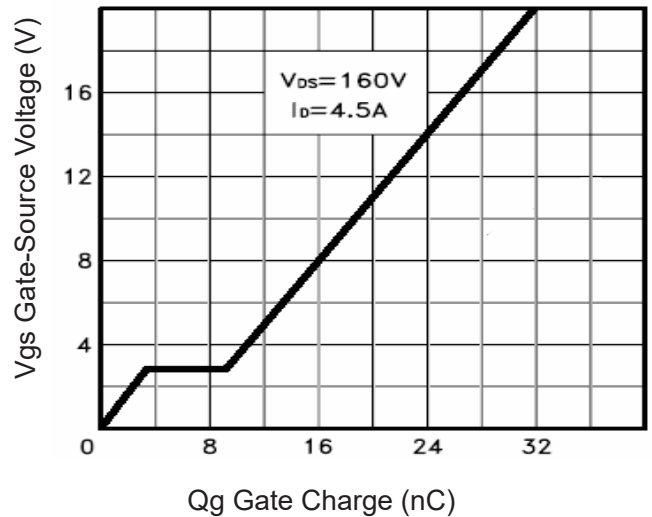


Figure 5 Gate Charge

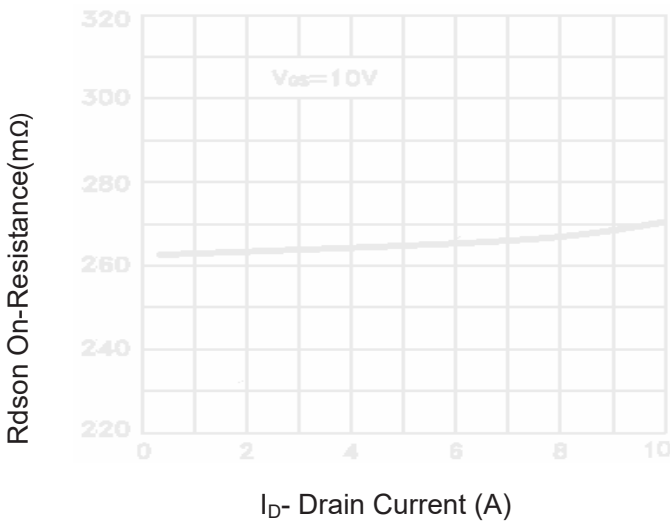


Figure 3 Rdson- Drain Current

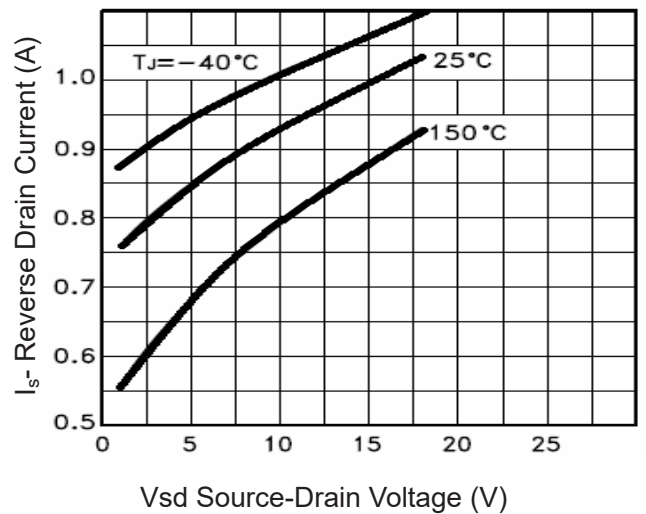


Figure 6 Source- Drain Diode Forward

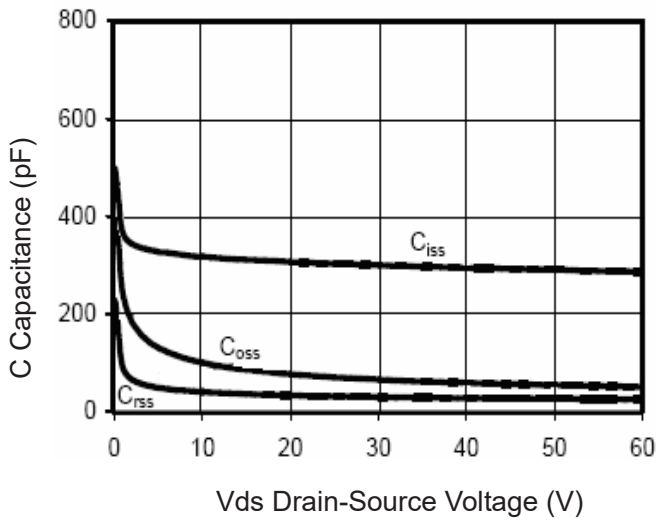


Figure 7 Capacitance vs Vds

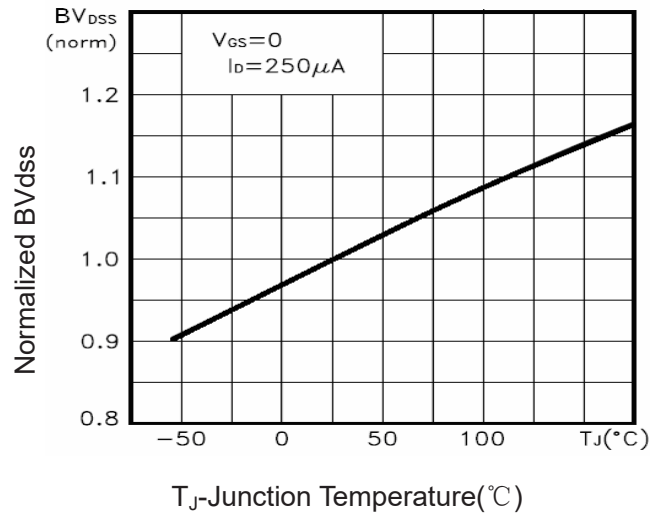


Figure 9 BV_{DSS} vs Junction Temperature

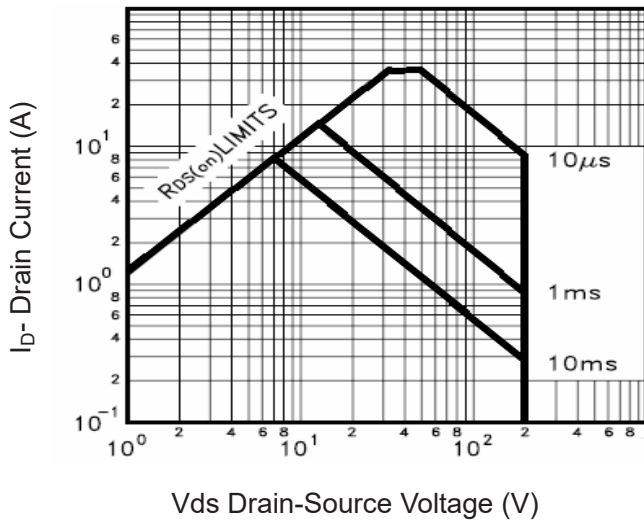


Figure 8 Safe Operation Area

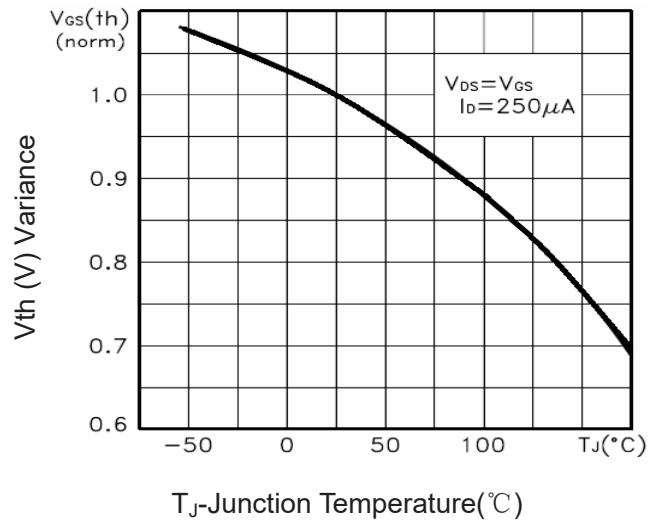


Figure 10 V_{GS(th)} vs Junction Temperature

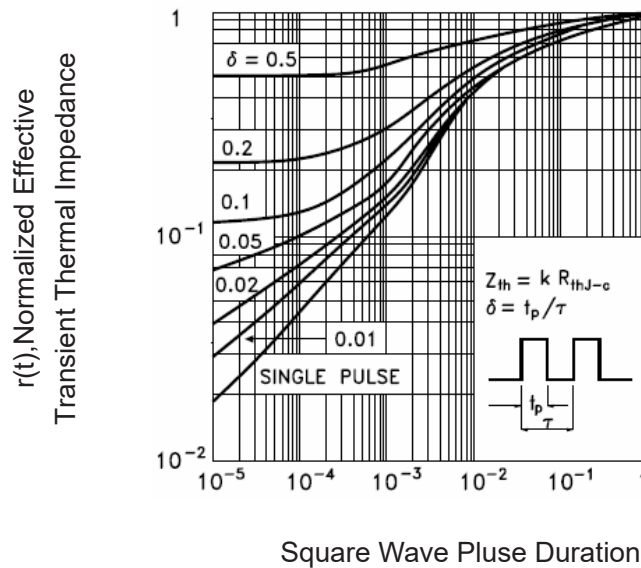
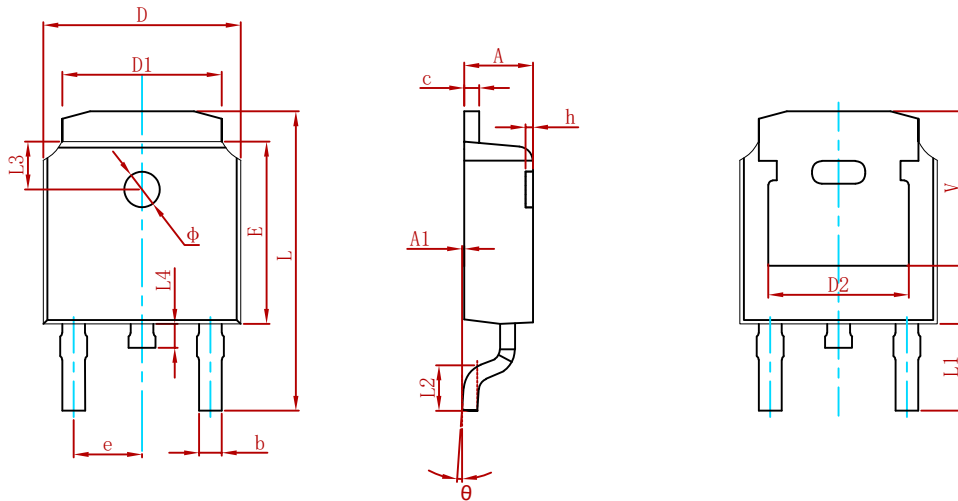


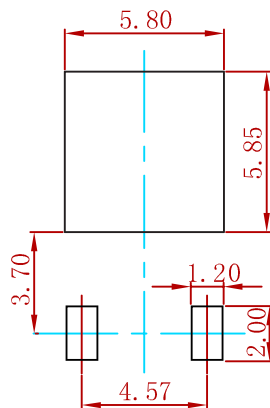
Figure 11 Normalized Maximum Transient Thermal Impedance

PACKAGE MECHANICAL DATA



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05mm.
3. The pad layout is for reference purposes only.

REEL SPECIFICATION

P/N	PKG	QTY
IRFR220N(MS)	TO-252	2500

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