

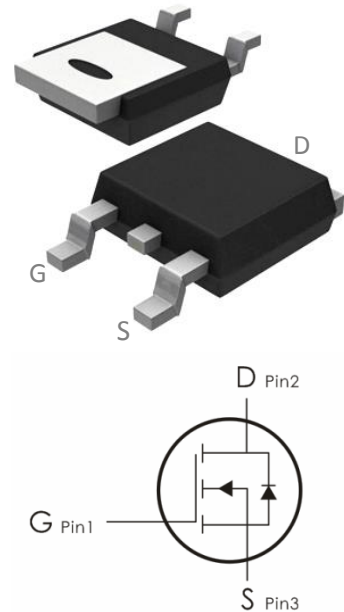
Description:

This N-Channel MOSFET 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.

Features:

- 1) $V_{DS}=60V, I_D=20A, R_{DS(on)} < 36m\Omega @ V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra $R_{DS(on)}$.
- 5) Excellent package for good heat dissipation.



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

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current- $T_C=25^\circ C$	20	A
	Continuous Drain Current- $T_C=100^\circ C$	13	
I_{DM}	Pulsed Drain Current ^{note1}	80	
E_{AS}	Single Pulse Avalanche Energy ^{note2}	40	mJ
P_D	Power Dissipation, $T_C=25^\circ C$	31	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4	$^\circ C/W$

Package Marking and Ordering Information:

Part NO.	Marking	Package
IRFR024N-DO	FR024N	TO-252

Electrical Characteristics: ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =60V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	1	1.6	3	V
R _{DS(on)}	Drain-Source On Resistance ^{note3}	V _{GS} =10V, I _D =10A	---	26	36	m Ω
		V _{GS} =4.5V, I _D =5A	---	36	45	m Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	1150	---	pF
C _{oss}	Output Capacitance		---	55	---	
C _{rss}	Reverse Transfer Capacitance		---	45.3	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =30V, I _D =15A, V _{GS} =10V, R _{GEN} =1.8Ω	---	7.6	---	ns
t _r	Rise Time		---	20	---	ns
t _{d(off)}	Turn-Off Delay Time		---	15	---	ns
t _f	Fall Time		---	24	---	ns
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =10A	---	20.3	---	nC
Q _{gs}	Gate-Source Charge		---	3.7	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	5.3	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V, I _S =20A	---	---	1.2	V
I _S	Maximum Continuous Drain to Source Diode Forward Current		---	---	20	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		---	---	80	A

trr	Reverse Recovery Time	IF =10A, di/dt = 100A/μs	---	29	---	Ns
qrr	Reverse Recovery Charge		---	43	---	nc

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition : $T_J=25^{\circ}\text{C}$, $V_{DD}=30\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$

Typical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

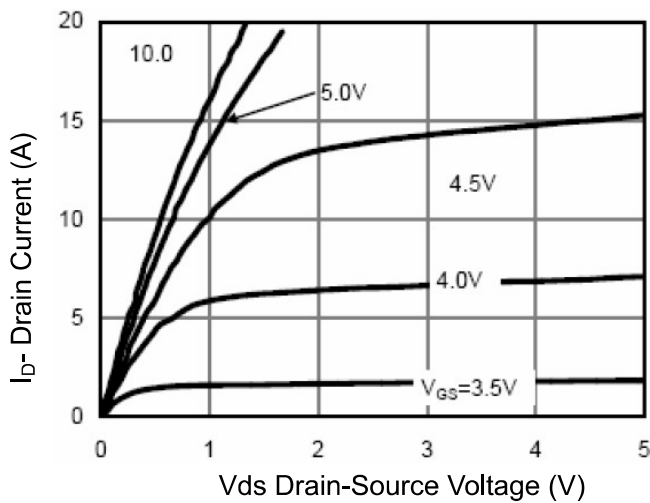


Figure 1 Output Characteristics

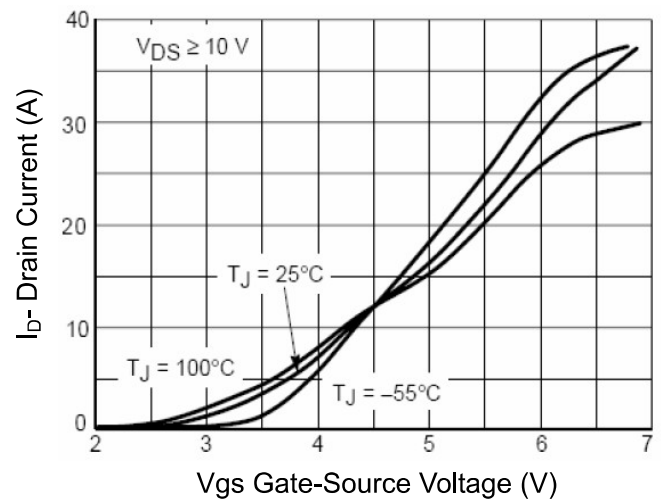


Figure 2 Transfer Characteristics

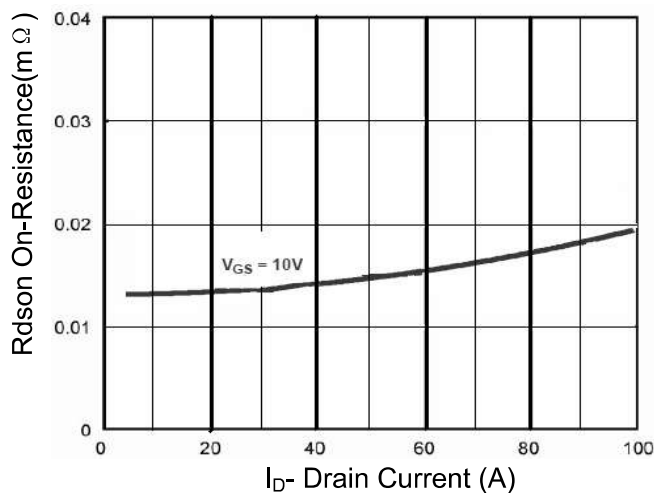


Figure 3 Rdson- Drain Current

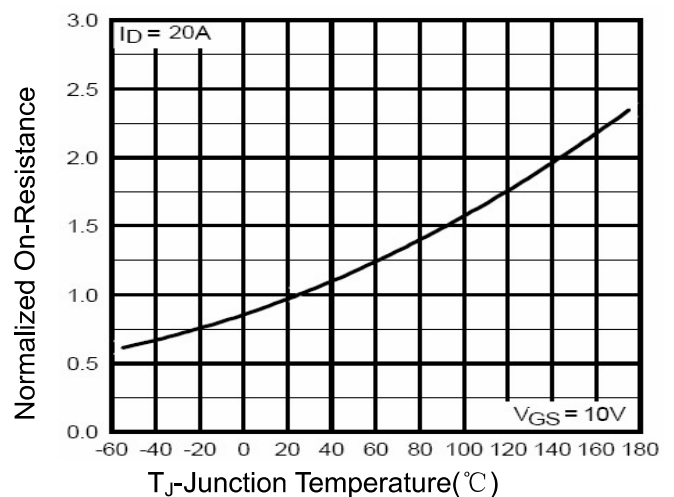


Figure 4 Rdson-Junction Temperature

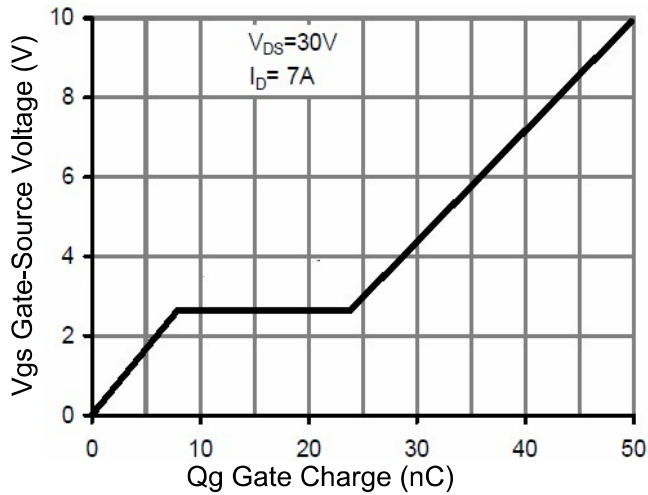


Figure 5 Gate Chare

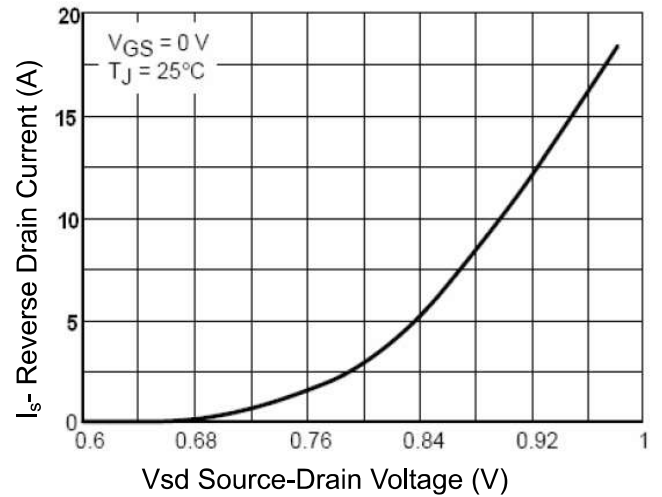


Figure 6 Source- Drain Diode Forward

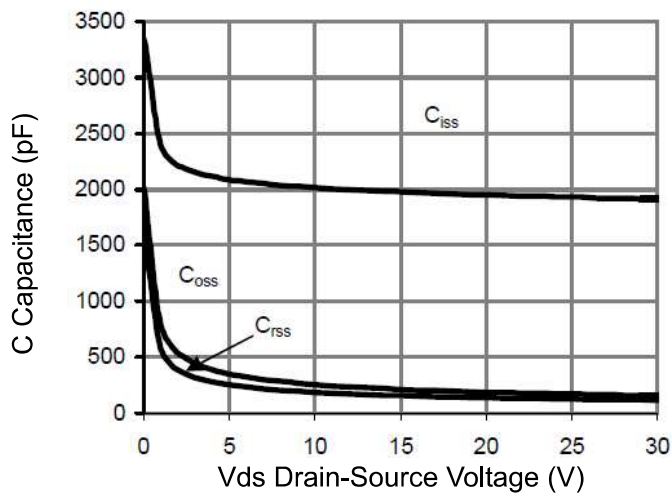


Figure 7 Capacitance vs Vds

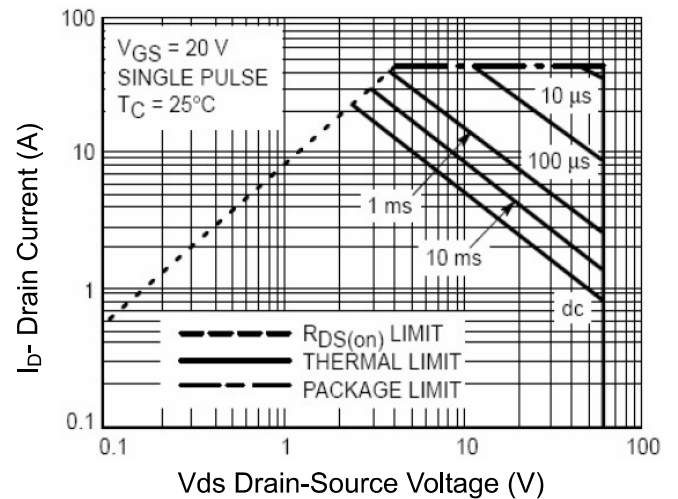


Figure 8 Safe Operation Area

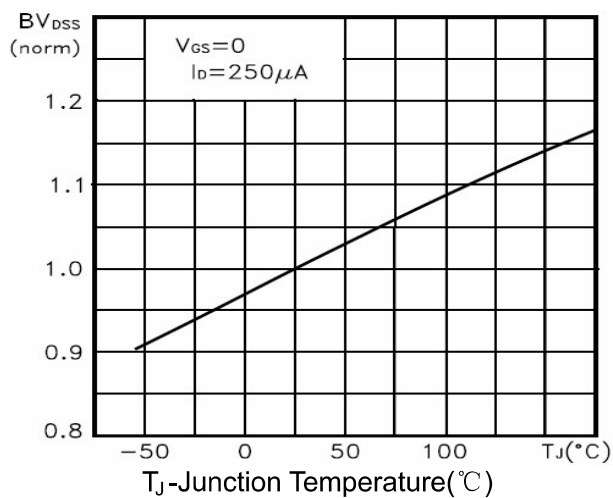


Figure 9 BV vs Junction Temperature

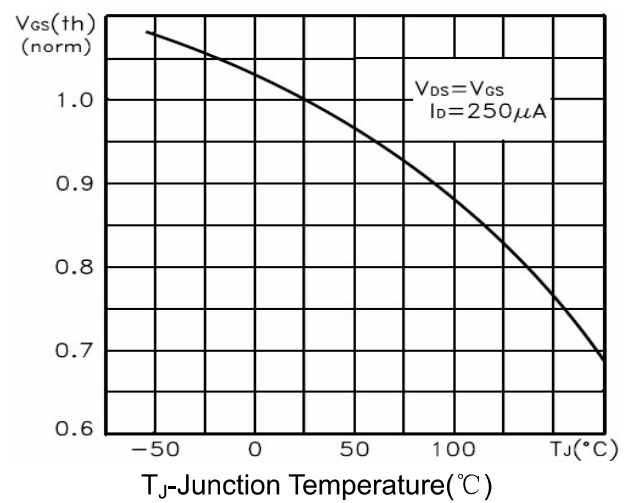


Figure 10 $V_{GS(th)}$ vs Junction Temperature

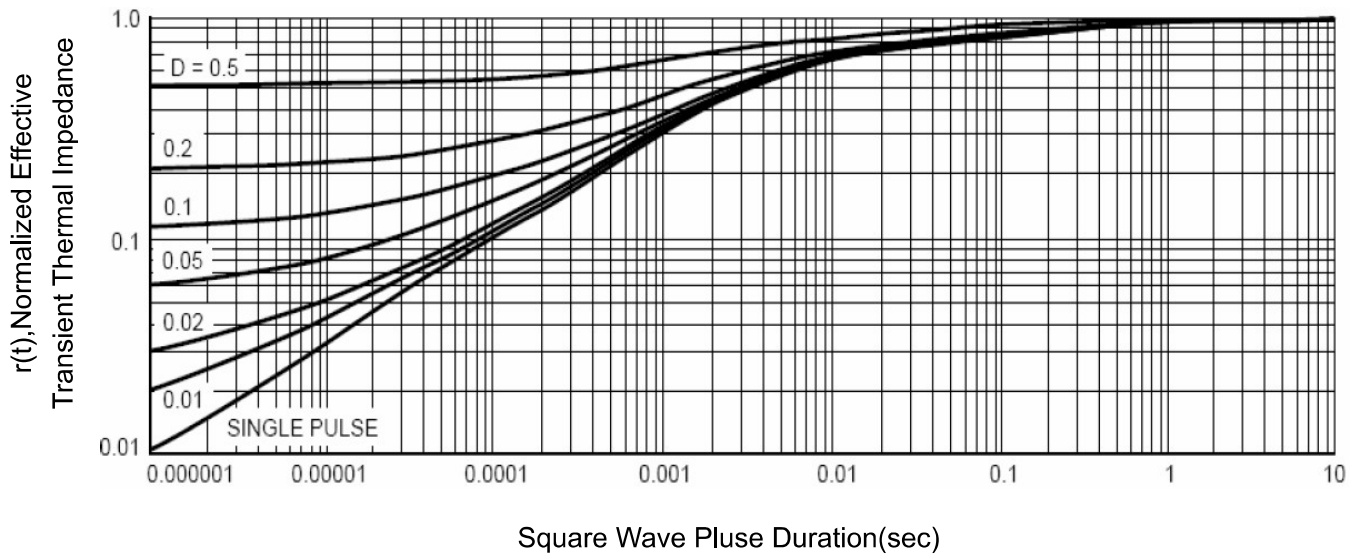


Figure 11 Normalized Maximum Transient Thermal Impedance