

QIAOXIN N-Channel **Super Trench II** Power MOSFET

Description

The series of devices uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(on)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

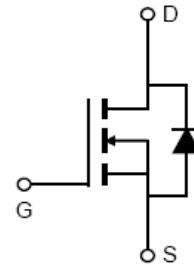
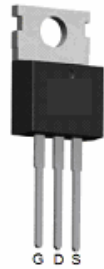
Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- $V_{DS} = 72V, I_D = 140A$
 $R_{DS(on)} = 3.3m\Omega$, typical @ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

TO-220



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VCRR035N72	VCRR035N72	TO-220	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	72	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	140	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	108	A
Pulsed Drain Current	I_{DM}	560	A
Maximum Power Dissipation	P_D	190	W
Derating factor		1.27	W/°C
Single pulse avalanche energy ^(Note 5)	E_{AS}	870	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.79	°C/W
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	72		-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=72V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=70A$	-	3.3	3.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=70A$	75	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=35V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	4250	-	PF
Output Capacitance	C_{oss}		-	670	-	PF
Reverse Transfer Capacitance	C_{rss}		-	28	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=35V, I_D=70A$ $V_{GS}=10V, R_G=1.6\Omega$	-	16	-	nS
Turn-on Rise Time	t_r		-	10	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	nS
Turn-Off Fall Time	t_f		-	8	-	nS
Total Gate Charge	Q_g	$V_{DS}=35V, I_D=70A,$ $V_{GS}=10V$	-	67.5	-	nC
Gate-Source Charge	Q_{gs}		-	18.8		nC
Gate-Drain Charge	Q_{gd}		-	13.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=70A$	-		1.2	V
Diode Forward Current (Note 2)	I_S		-	-	140	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}\text{C}, I_F = 70A$ $di/dt = 100A/\mu s$ (Note 3)	-	68	-	nS
Reverse Recovery Charge	Q_{rr}		-	98	-	nC

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
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=35V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega$

Typical Electrical and Thermal Characteristics

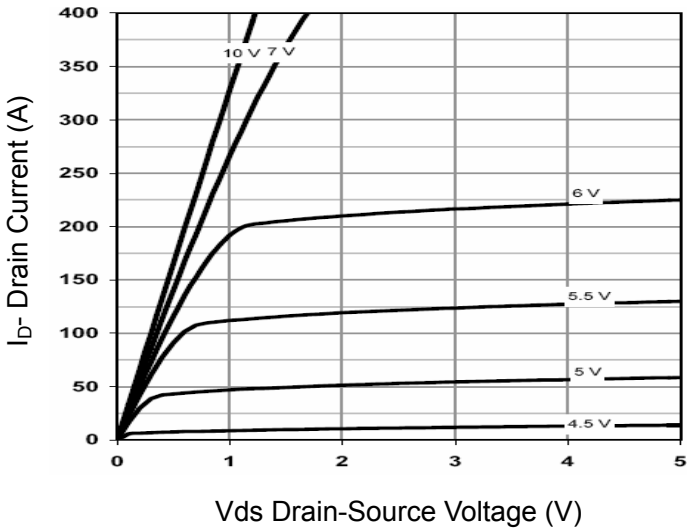


Figure 1 Output Characteristics

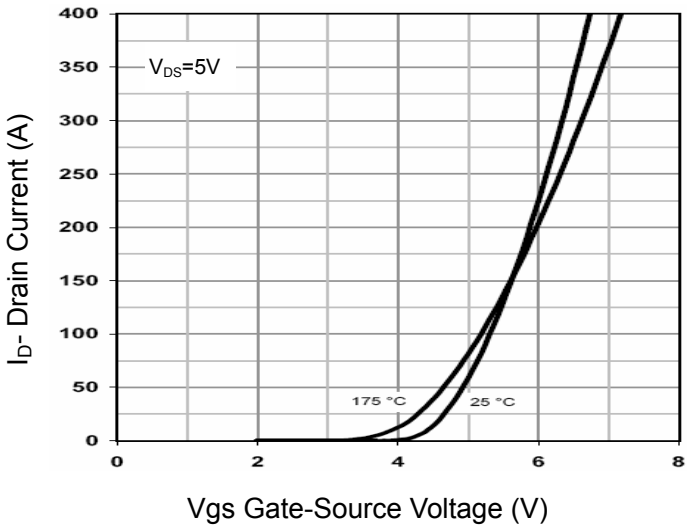


Figure 2 Transfer Characteristics

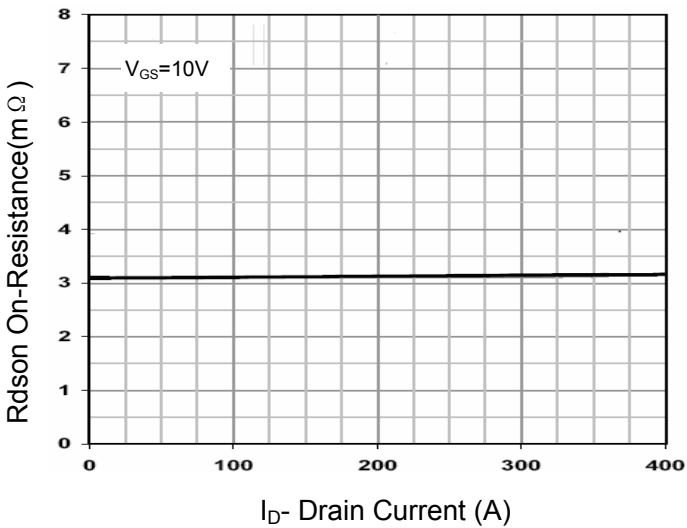


Figure 3 Rdson- Drain Current

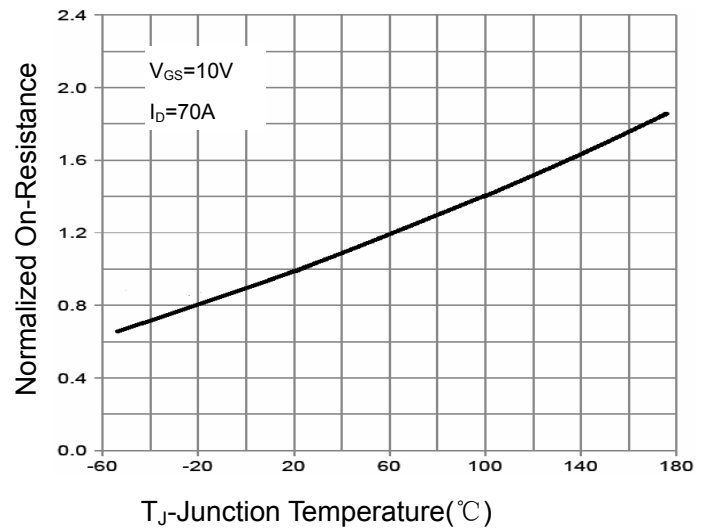


Figure 4 Rdson-Junction Temperature

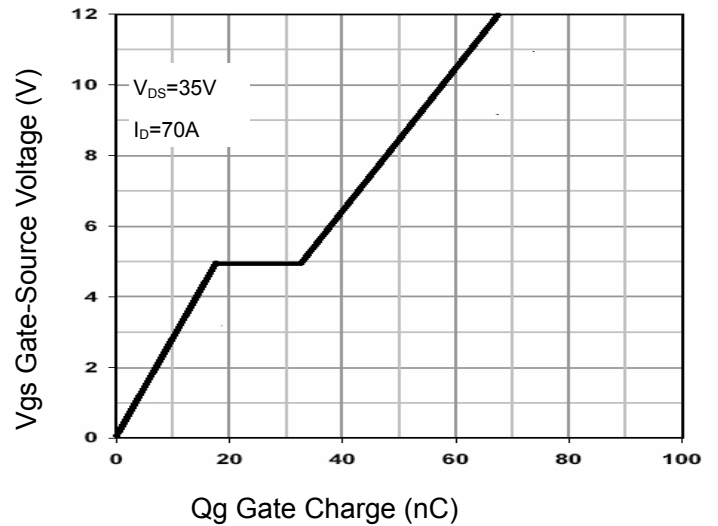


Figure 5 Gate Charge

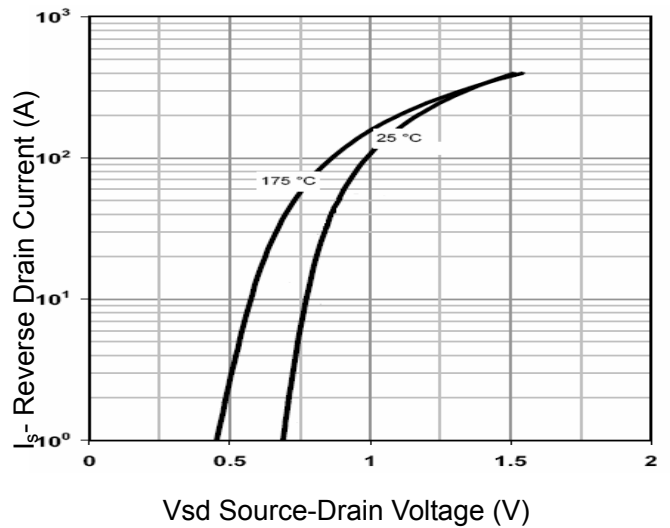
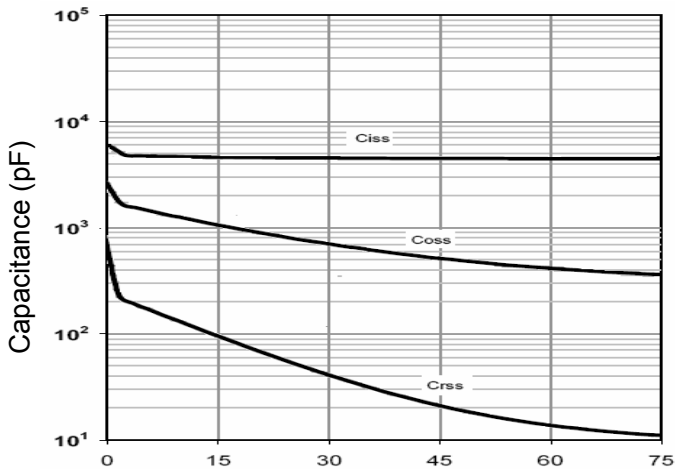
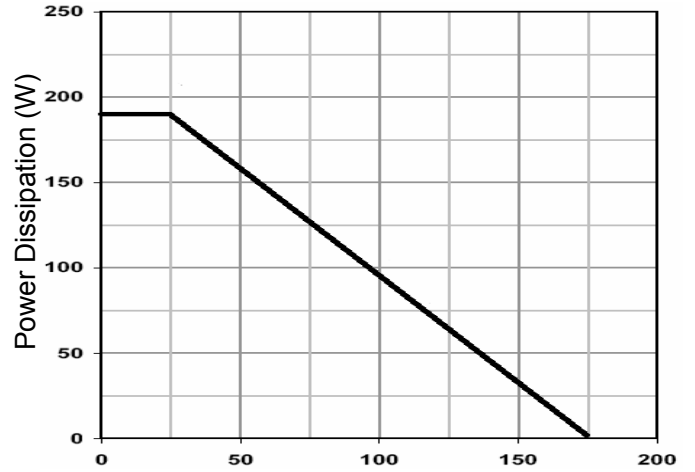


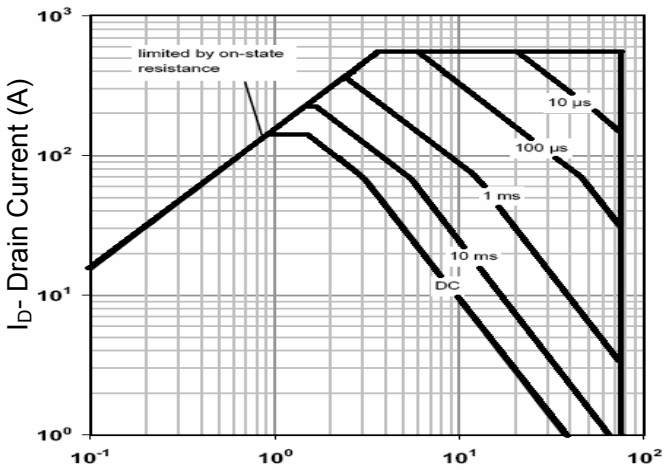
Figure 6 Source- Drain Diode Forward



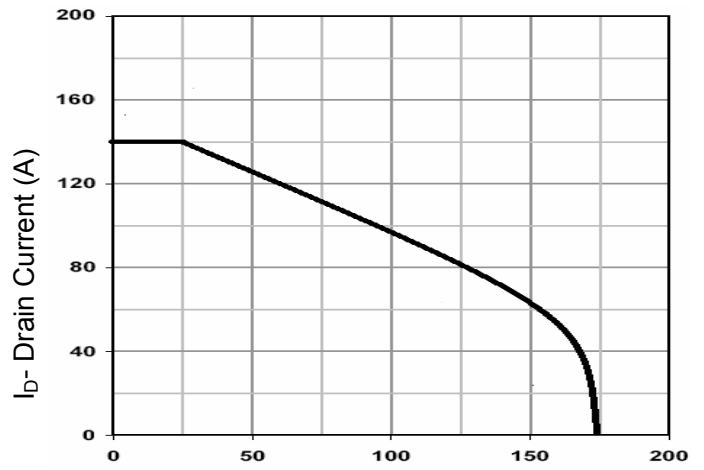
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



T_J-Junction Temperature(°C)
Figure 9 Power De-rating



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J-Junction Temperature (°C)
Figure 10 Current De-rating

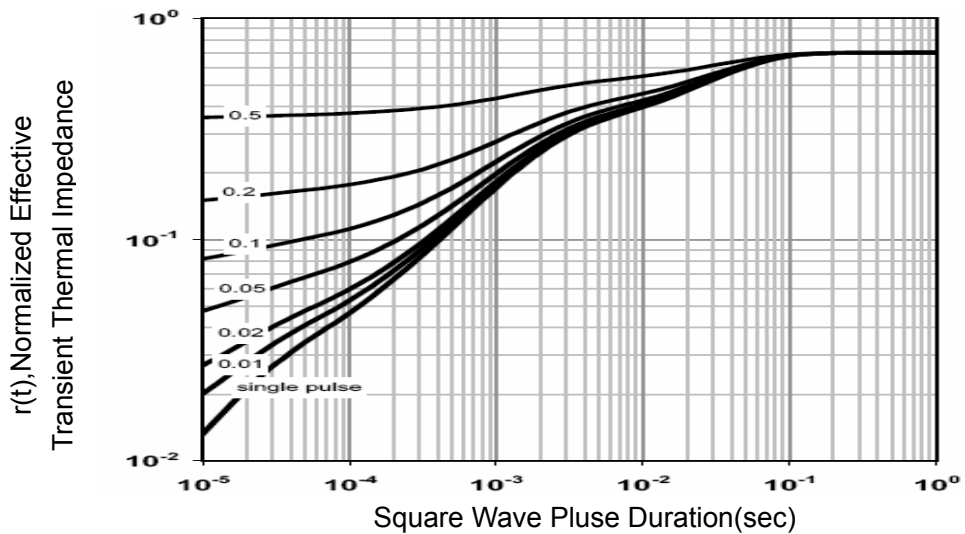
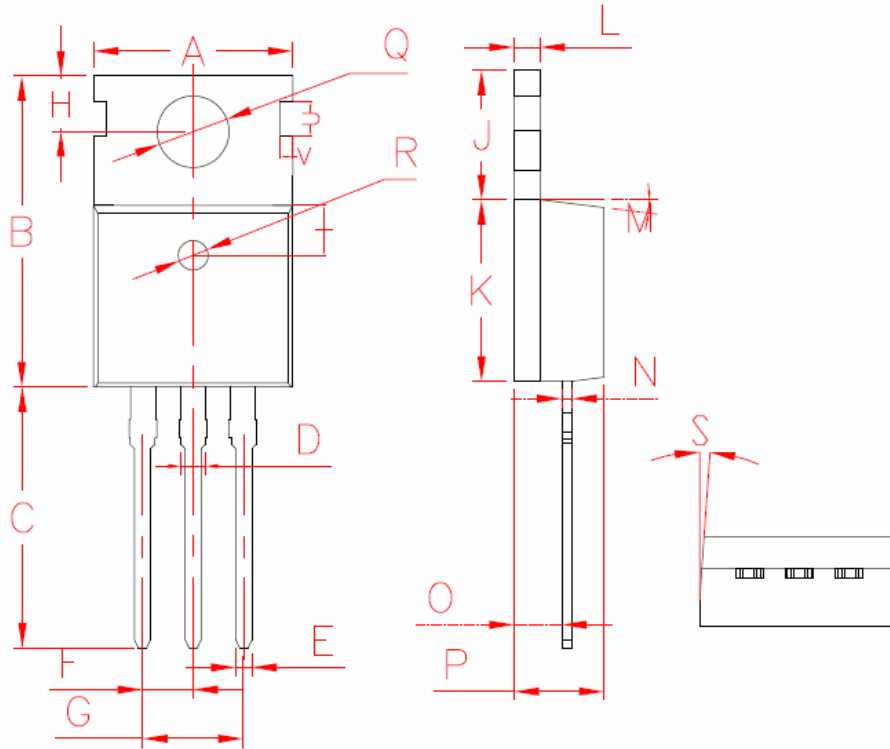


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



Symbol	Min	Non	Max
A	9.80	10.00	10.20
B	15.40	15.60	15.80
C	12.75	13.10	13.45
D	1.18	1.31	1.44
E	0.70	0.80	0.90
F	2.42	2.54	2.66
G	4.84	5.08	5.32
H	2.73	2.80	2.87
I	2.40	2.50	2.60
J	6.40	6.50	6.60
K	9.00	9.10	9.20
L	1.29	1.30	1.32
M	6.5°	7.0°	7.5°
N	0.48	0.50	0.56
O	2.35	2.4	2.5
P	4.4	4.5	4.7
Q	3.5	3.6	3.63
R	1.4	1.5	1.6
S	2°	2.5°	3°
U	1.65	1.75	1.85
V	0.58	0.68	0.78

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