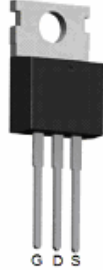


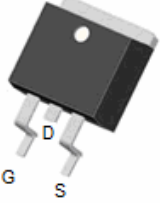
QIAOXIN N-Channel Super Trench II Power MOSFET

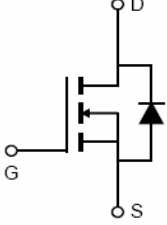
<p>Description</p> <p>The series of devices uses Super Trench II technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g. This device is ideal for high-frequency switching and synchronous rectification.</p> <p>Application</p> <ul style="list-style-type: none"> ● DC/DC Converter ● Ideal for high-frequency switching and synchronous rectification 	<p>General Features</p> <ul style="list-style-type: none"> ● $V_{DS} = 120V, I_D = 190A$ $R_{DS(ON)} = 3.0m\Omega$, typical (TO-220) @ $V_{GS} = 10V$ $R_{DS(ON)} = 2.8m\Omega$, typical (TO-263) @ $V_{GS} = 10V$ ● Excellent gate charge x $R_{DS(on)}$ product(FOM) ● Very low on-resistance $R_{DS(on)}$ ● 175 °C operating temperature ● Pb-free lead plating
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TO-220



TO-263





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VCRR035N12	VCRR035N12	TO-220	-	-	-
VCRR035N12D	VCRR035N12D	TO-263-2L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	120	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	190	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	135	A
Pulsed Drain Current	I_{DM}	760	A
Maximum Power Dissipation	P_D	300	W
Derating factor		2	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	2300	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.5	$^\circ C/W$
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Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Off Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	120		-	V	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =120V, V _{GS} =0V	-	-	1	μA	
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA	
On Characteristics (Note 3)							
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0	3.0	4.0	V	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =95A	TO-220	-	3.0	3.5	mΩ
			TO-263		2.8	3.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =95A		90	-	S	
Dynamic Characteristics (Note 4)							
Input Capacitance	C _{iss}	V _{DS} =60V, V _{GS} =0V, F=1.0MHz	-	12700	-	PF	
Output Capacitance	C _{oss}		-	870	-	PF	
Reverse Transfer Capacitance	C _{rss}		-	48	-	PF	
Switching Characteristics (Note 4)							
Turn-on Delay Time	t _{d(on)}	V _{DD} =60V, I _D =95A V _{GS} =10V, R _G =1.6Ω	-	34	-	nS	
Turn-on Rise Time	t _r		-	27	-	nS	
Turn-Off Delay Time	t _{d(off)}		-	78	-	nS	
Turn-Off Fall Time	t _f		-	30	-	nS	
Total Gate Charge	Q _g	V _{DS} =50V, I _D =95A, V _{GS} =10V	-	213	-	nC	
Gate-Source Charge	Q _{gs}		-	58		nC	
Gate-Drain Charge	Q _{gd}		-	58		nC	
Drain-Source Diode Characteristics							
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =95A	-		1.2	V	
Diode Forward Current (Note 2)	I _S		-	-	190	A	
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 100A	-	101	-	nS	
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs (Note 3)	-	280	-	nC	

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T_J=25°C, V_{DD}=60V, V_G=10V, L=0.5mH, R_G=25Ω

Typical Electrical and Thermal Characteristics

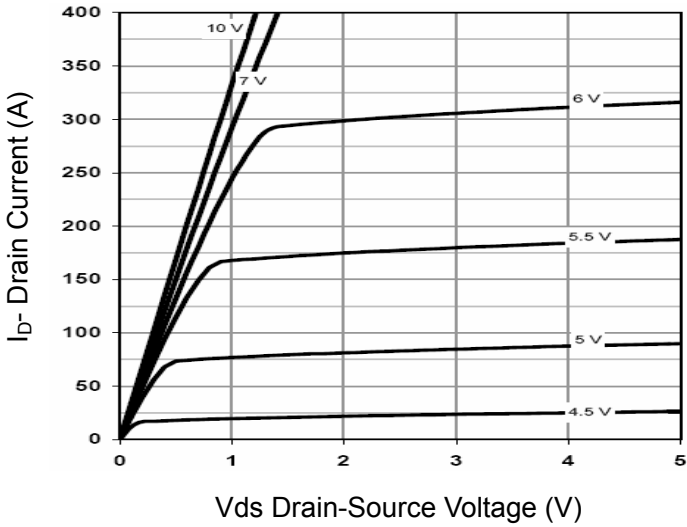


Figure 1 Output Characteristics

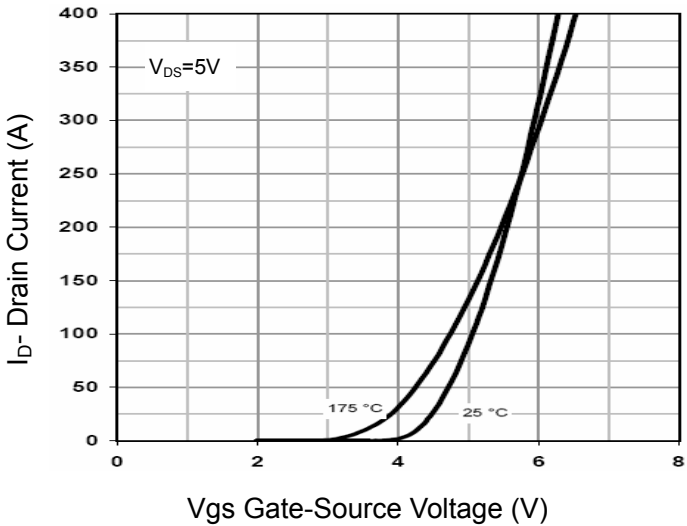


Figure 2 Transfer Characteristics

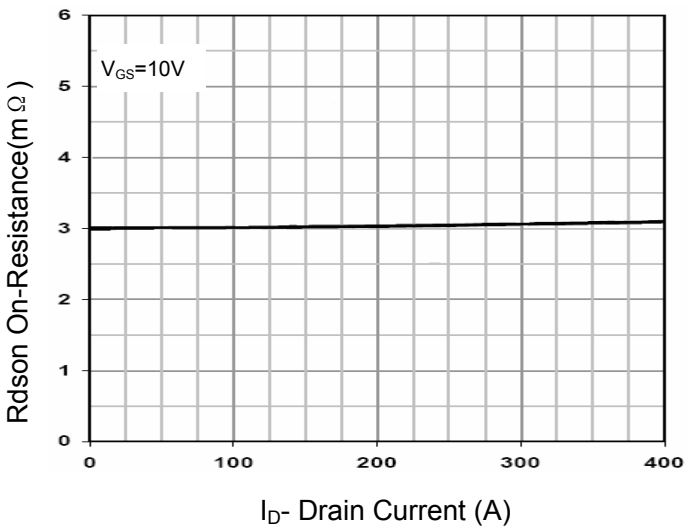


Figure 3 Rdson- Drain Current

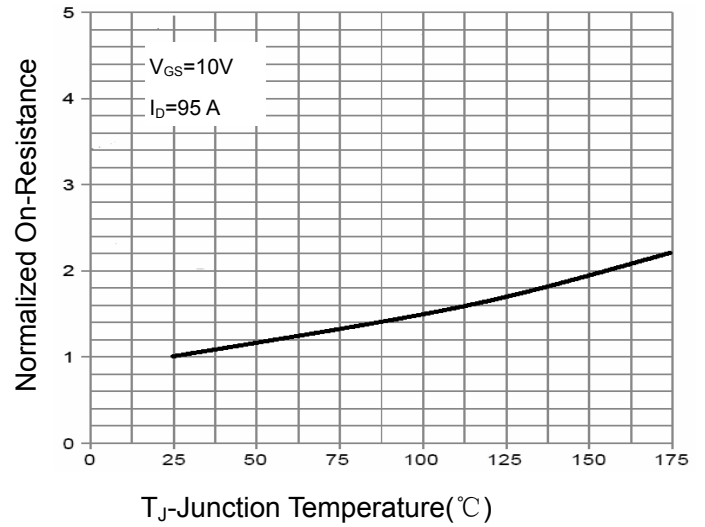


Figure 4 Rdson-Junction Temperature

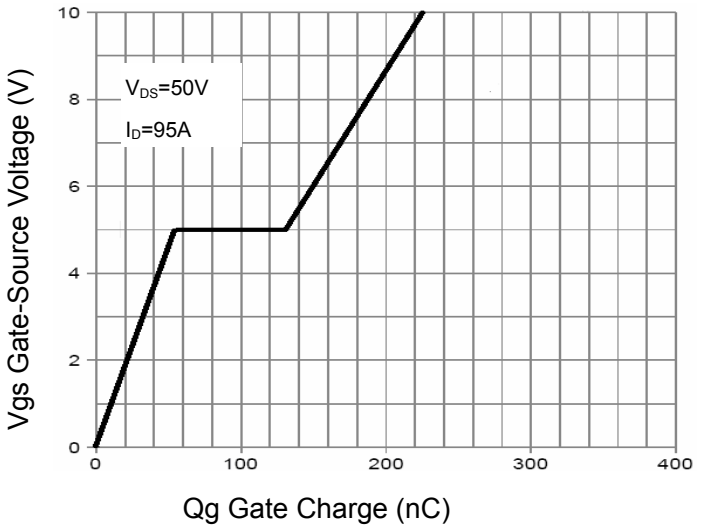


Figure 5 Gate Charge

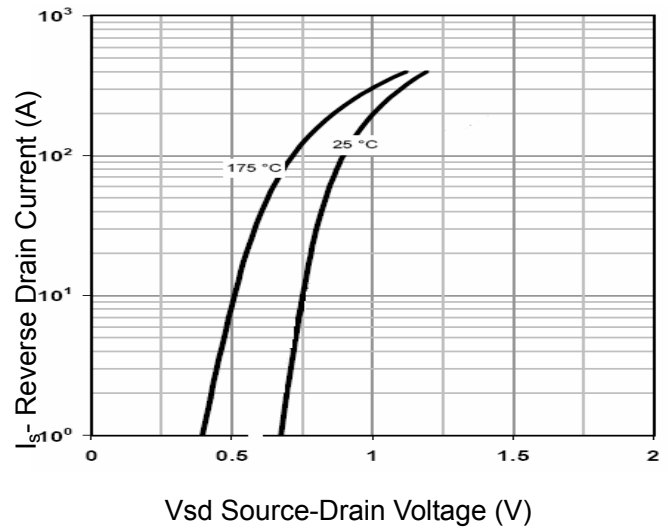
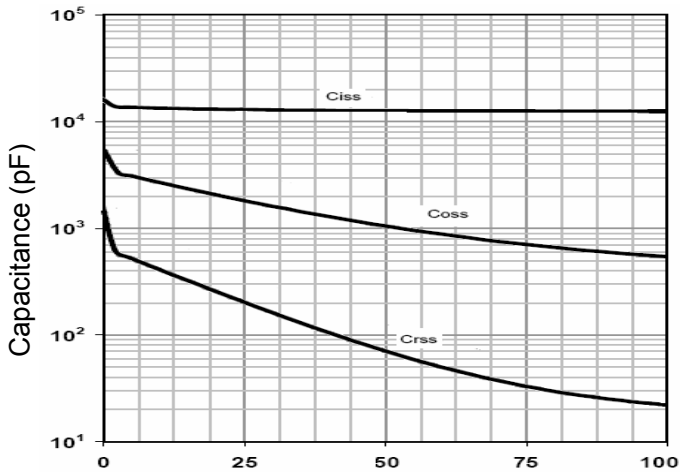
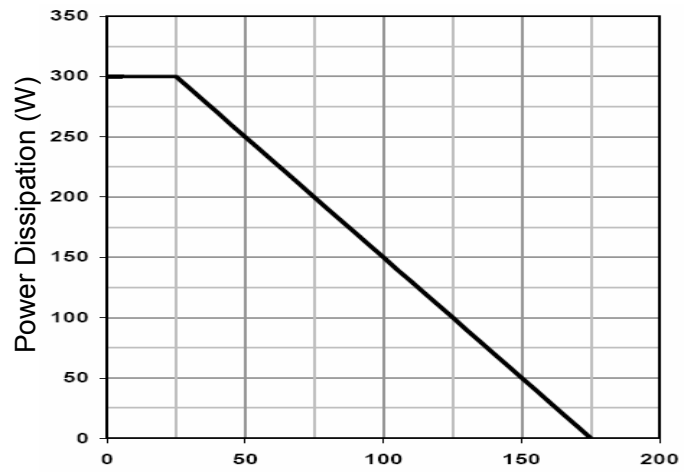


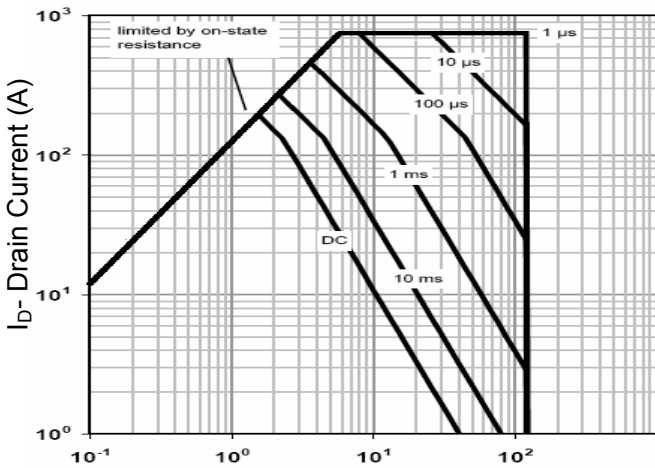
Figure 6 Source- Drain Diode Forward



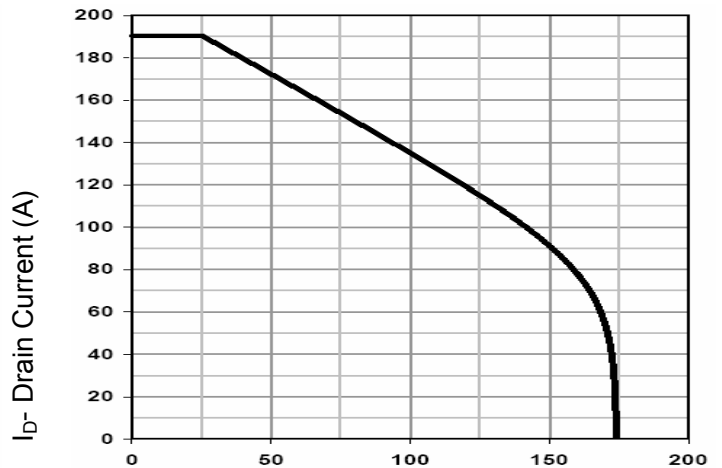
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



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

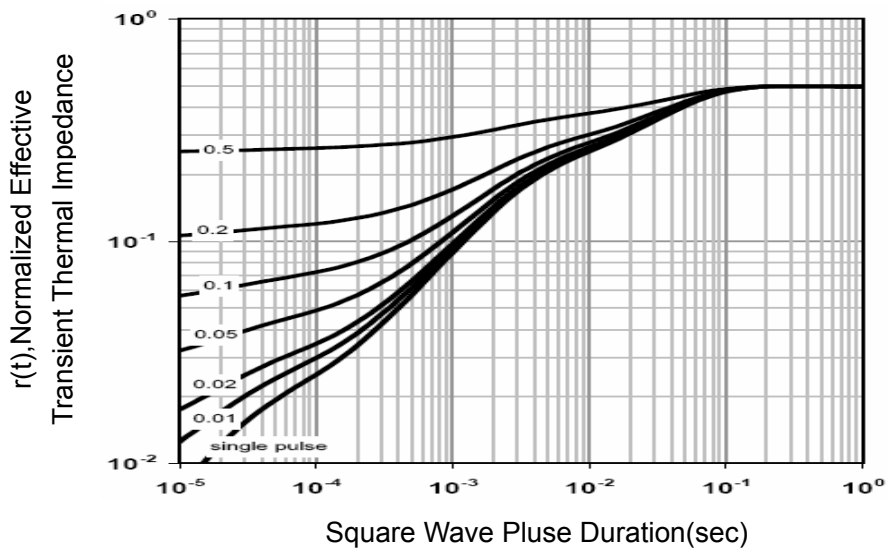


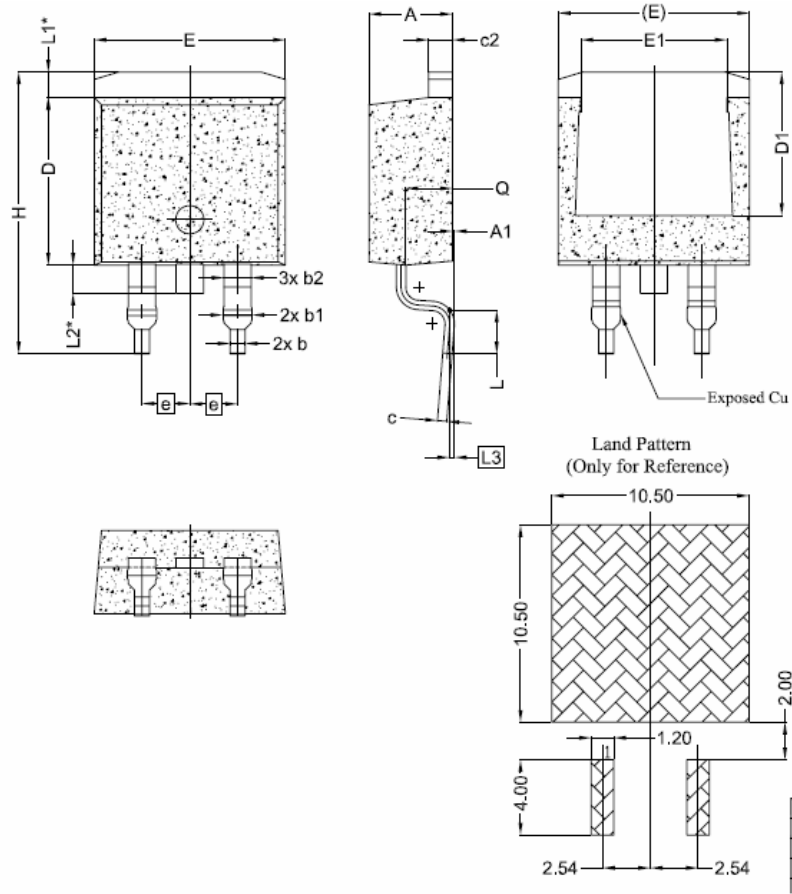
Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

TO-263-2L Package Information



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	6.86	7.65	—
E	9.96	10.16	10.36
E1	6.89	7.77	7.89
e	2.54 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.79
L1	1.36 REF.		
L2	1.50 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70

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