VCRR P-ChannelEnhancement Mode Power MOSFET

Description

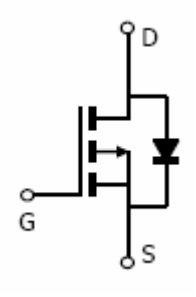
The VCRR55P12 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

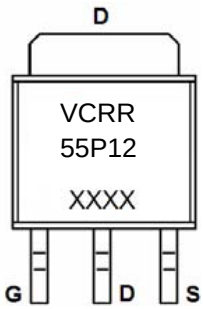
- V_{DS} =-55V,I_D =-15A
  $R_{DS(ON)}$ <75mΩ @ V_{GS}=-10V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and high frequency circuits
- DC-DC Converter



Schematic diagram



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package
VCRR55P12		TO-252

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-55	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	-15	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	-10	A
Pulsed Drain Current	I_{DM}	-50	A
Maximum Power Dissipation	P_D	35	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance ,Junction-to-Case (Note 2)	$R_{\theta JC}$	4.3	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

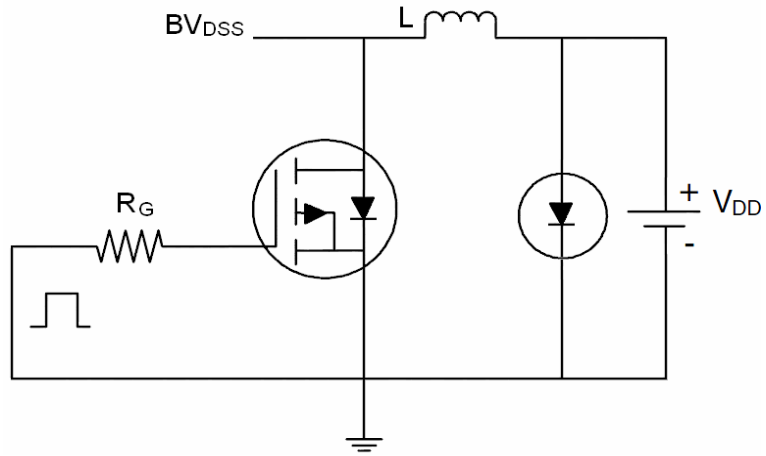
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-55V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.5	-2.6	-3.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-5A	-	60	75	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-15V,I_D=-5A	16	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-20V,V_{GS}=0V, F=1.0MHz	-	1450	-	PF
Output Capacitance	C_{oss}		-	145	-	PF
Reverse Transfer Capacitance	C_{rss}		-	110	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-30V, ,R_L=30Ω V_{GS}=-10V,R_{GEN}=6Ω	-	8	-	nS
Turn-on Rise Time	t_r		-	9	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	65	-	nS
Turn-Off Fall Time	t_f		-	30	-	nS
Total Gate Charge	Q_g	V_{DS}=-30V,I_D=-5A, V_{GS}=-10V	-	26	-	nC
Gate-Source Charge	Q_{gs}		-	4.5	-	nC
Gate-Drain Charge	Q_{gd}		-	7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-15A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-15	A

Notes:

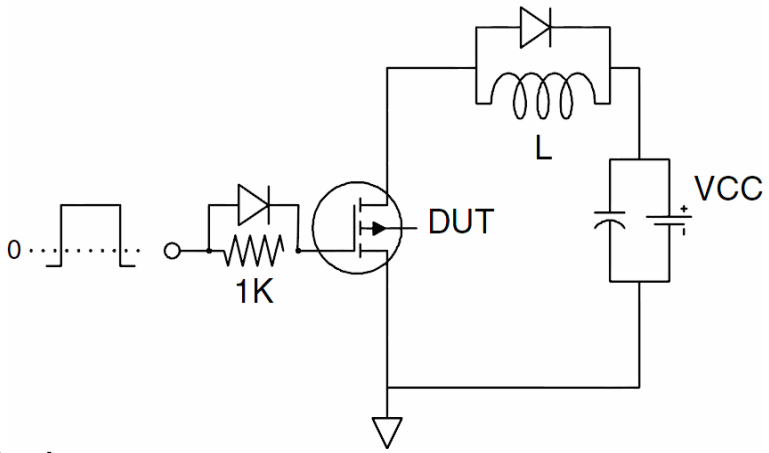
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Test Circuit

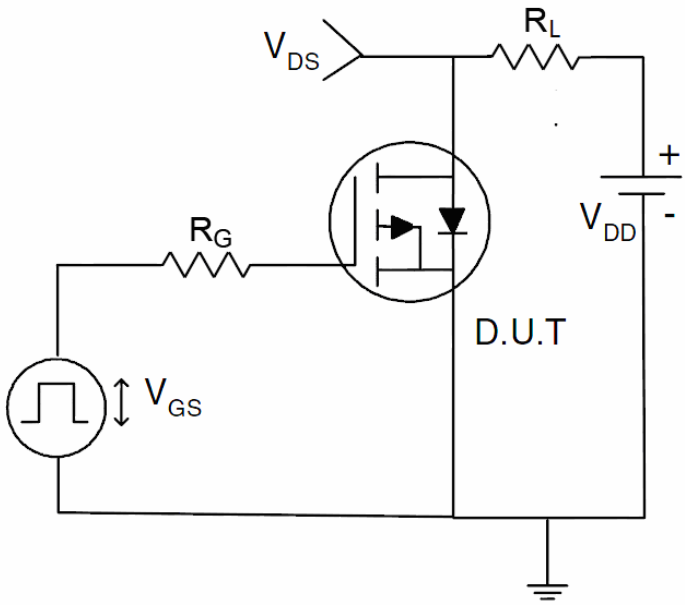
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

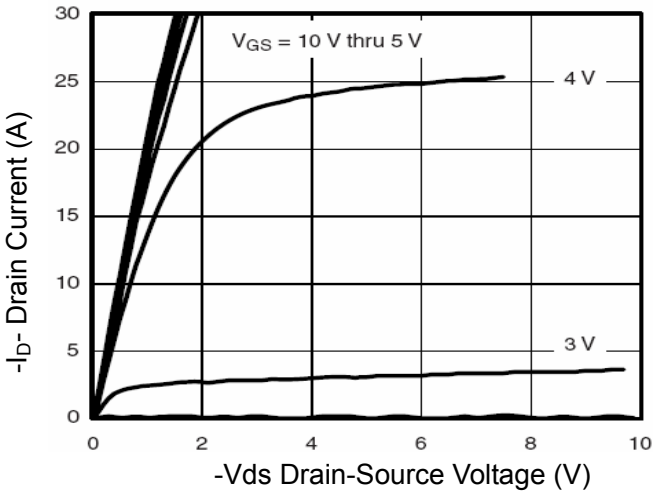


Figure 1 Output Characteristics

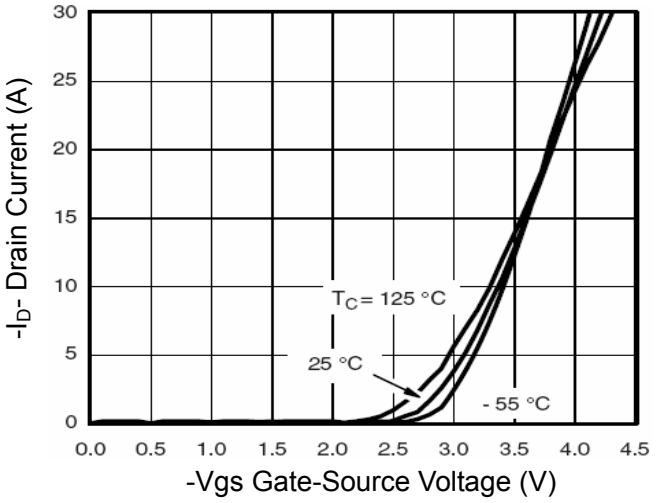


Figure 2 Transfer Characteristics

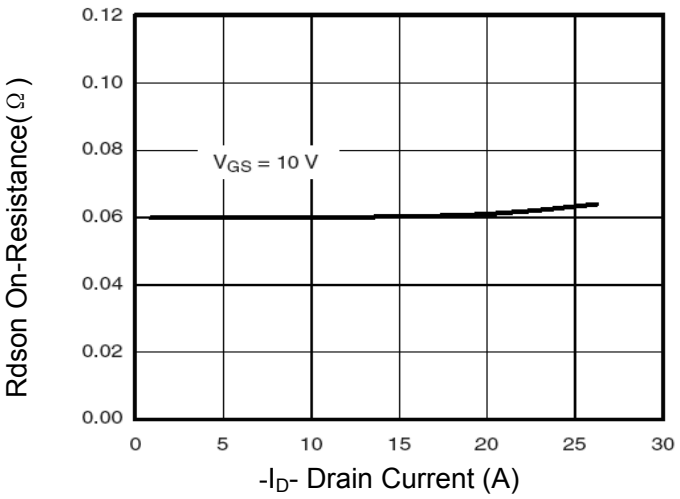


Figure 3 Rdson- Drain Current

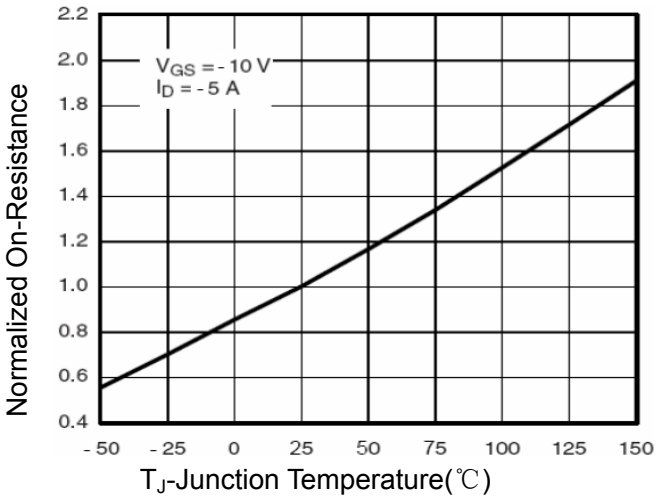


Figure 4 Rdson-Junction Temperature

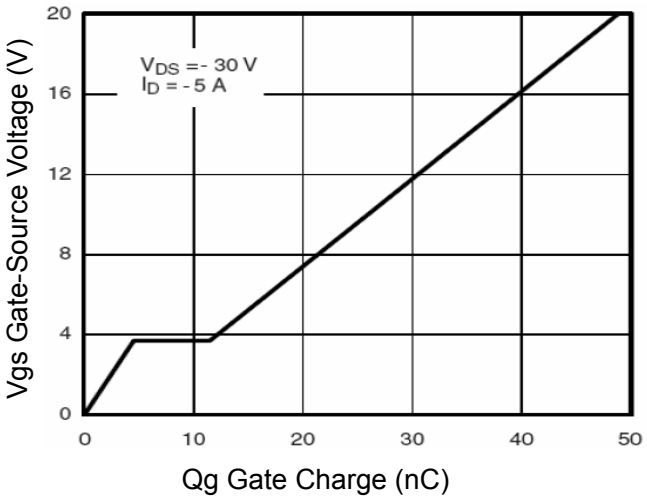


Figure 5 Gate Charge

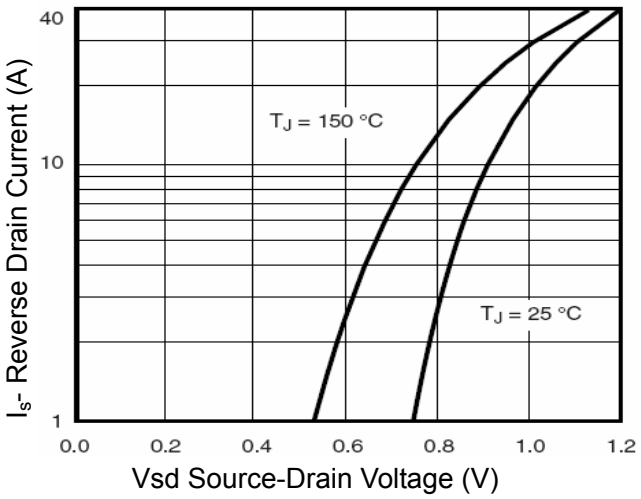


Figure 6 Source- Drain Diode Forward

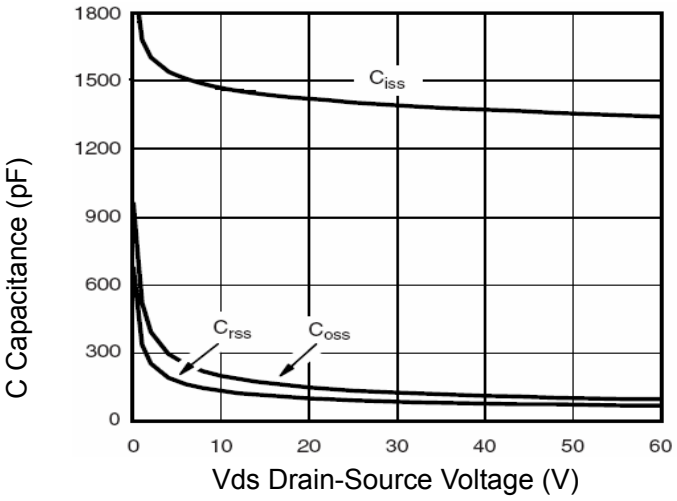


Figure 7 Capacitance vs Vds

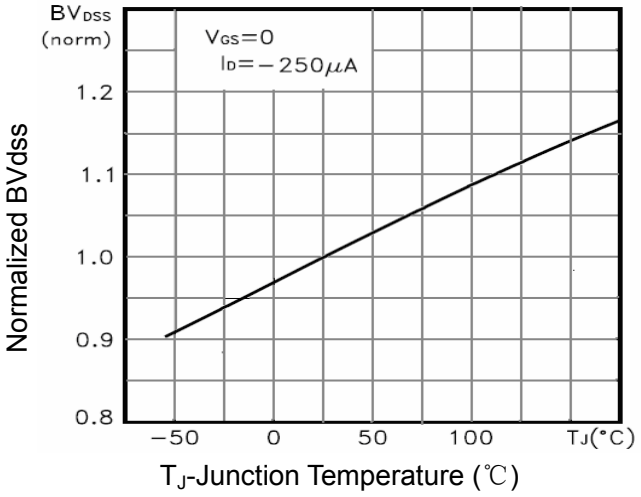


Figure 9 BV_{DSS} vs Junction Temperature

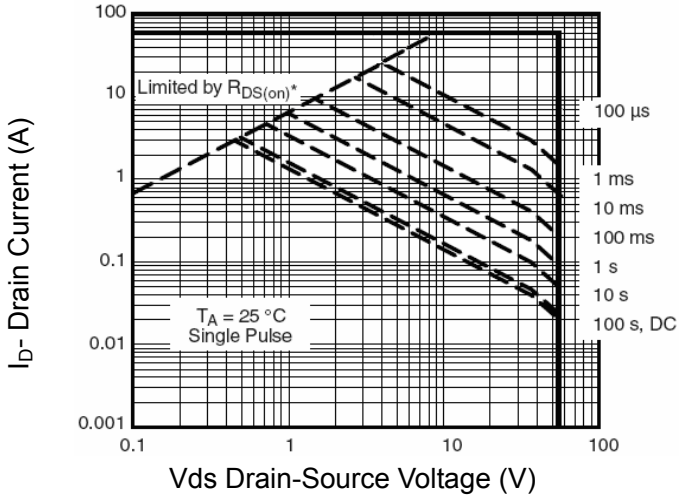


Figure 8 Safe Operation Area

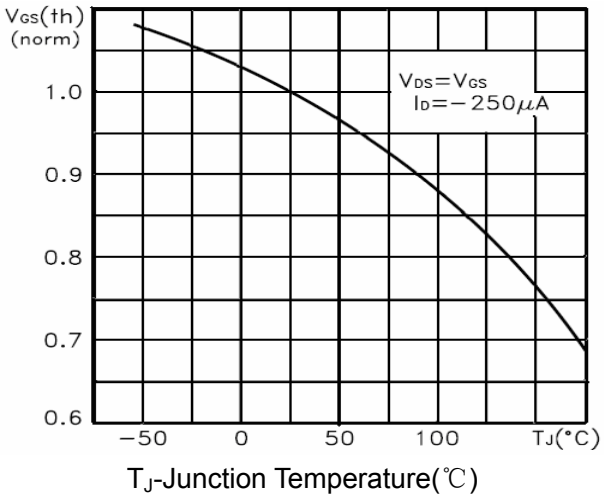


Figure 10 $V_{GS(th)}$ vs Junction Temperature

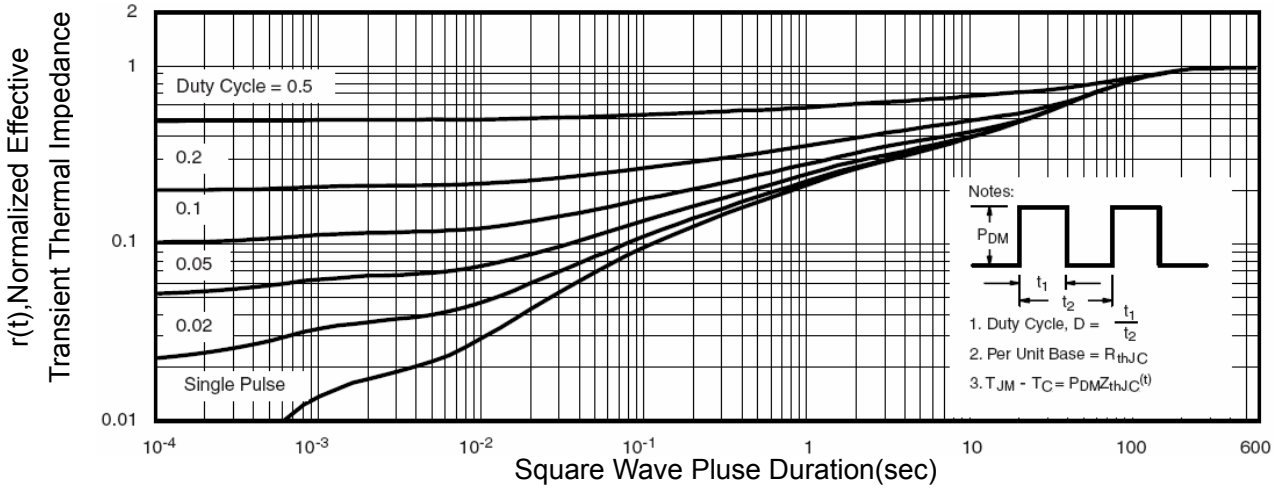
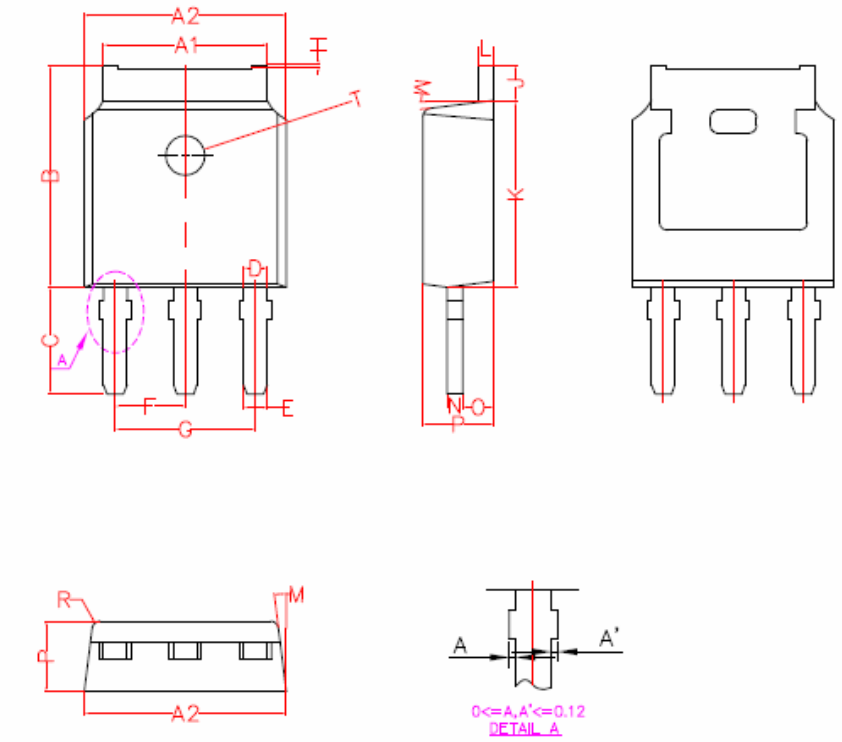


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-251 Package Information



Symbol	Min	Non	Max
A1	5.22	5.32	5.42
A2	6.55	6.60	6.65
B	7.05	7.10	7.15
C	4.80	5.00	5.20
D		1.00	
E		0.76	
F		2.286	
G		4.572	
H		0.15	
J	0.95	1.00	1.05
K	6.05	6.10	6.15
L		0.508	
M		7°	
N		0.508	
O	0.96	1.01	1.06
P	2.25	2.30	2.35
R		0.25	

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