CRMM0414S

40V Half Bridge Power MOSFET

Features

- Uses CRM(CQ) advanced Trench technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Q_gx$R_{DS(on)}$ product(FOM)
- Half Bridge Power MOSFET

Product Summary

Symbol	N-Ch1	N-Ch2
V_{DS}	40V	40V
$R_{DS(on)\ typ.}$	9mΩ	9mΩ
I_D	48A	48A

Applications

- Synchronous Buck Converter
- Motor Drive

100% DVDS Tested

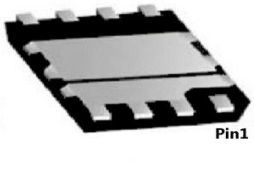
100% Avalanche Tested

RoHS HF

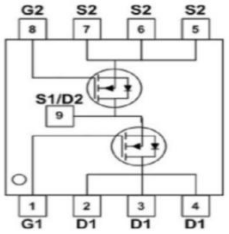
PDFN5x6S



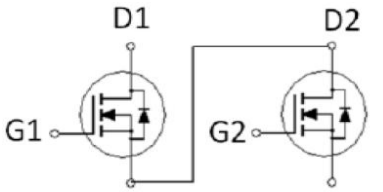
Top View



Bottom View



Top View



N-Ch1 N-Ch2

Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRMM0414S	CRMM0414S	PDFN5x6S	Taping	N/A	N/A	4000pcs

Absolute Maximum Ratings

Parameter	Symbol	Maximum		Unit
		N-Ch1	N-Ch2	
Drain-source voltage	V_{DS}	40	40	V
Continuous drain current T_C = 25°C (Silicon limit)	I_D	51	51	A
Continuous drain current T_C = 25°C (Package limit)	I_D	48	48	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	192	192	A
Avalanche energy, single pulse (L=0.5mH, Rg=25Ω)	E_{AS}	100	100	mJ
Gate-Source voltage	V_{GS}	±20	±20	V
Power dissipation (T_C = 25°C)[1]	P_{tot}	38.6	38.6	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150		°C

Thermal Resistance

Parameter	Symbol	Typ	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	2.7	3.2	°C/W
SMD version, device on PCB [2] Thermal resistance, junction – ambient	R_{thJA}	66.0	79.2	°C/W

NOTE:

1.The power dissipation PD is based on T_J(MAX)=150°C, using ≤ 10s junction-to-ambient thermal resistance.

2.The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design.

N-Ch1&N-Ch2 Electrical Characteristic (at T_J = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	40	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	1	1.5	2.5	V	V_{DS}=V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	0.08 -	1 5	μA	V_{DS}=40V, V_{GS}=0V T_J=25°C T_J=125°C
Gate-source leakage current	I_{GSS}	-	±10	±100	nA	V_{GS}=±20V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	11.5 9.0	15.0 12.0	mΩ	V_{GS}=4.5V, I_D=5A V_{GS}=10V, I_D=5A
Transconductance	g_{fs}	-	19.3	-	S	V_{DS}=5V, I_D=5A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	1930	-	pF	V_{GS}=0V, V_{DS}=20V, f=1MHz
Output Capacitance	C_{oss}	-	98	-		
Reverse Transfer Capacitance	C_{rss}	-	90	-		
Gate Total Charge	Q_G	-	43.4	-	nC	V_{GS}=10V, V_{DS}=20V, I_D=5A, f=1MHz
Gate-Source charge	Q_{gs}	-	8.5	-		
Gate-Drain charge	Q_{gd}	-	7.3	-		
Turn-on delay time	$t_{d(on)}$	-	8.3	-	ns	V_{GS}=10V, V_{DD}=20V, R_{G_ext}=2.7Ω, ID=5A
Rise time	t_r	-	22.7	-		
Turn-off delay time	$t_{d(off)}$	-	39.0	-		
Fall time	t_f	-	19.4	-		
Gate resistance	R_G	-	1.10	-	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.82	1.2	V	V_{GS}=0V, I_{SD}=10A
Body Diode Reverse Recovery Time	t_{rr}	-	16	-	ns	I_F=5A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	5.7	-	nC	

N-Ch1&N-Ch2 Typical Performance Characteristics

Fig 1: Output Characteristics

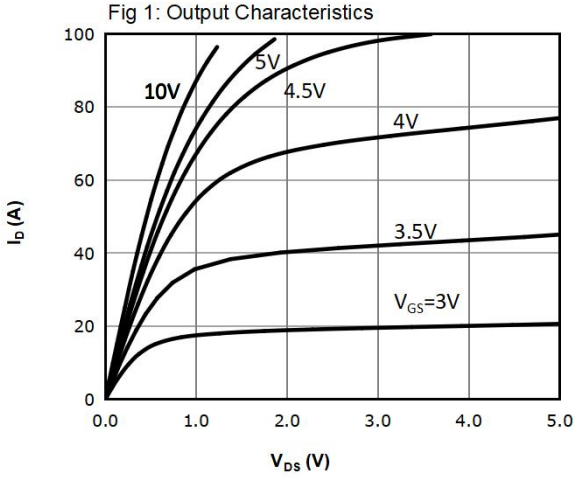


Fig 2: Transfer Characteristics

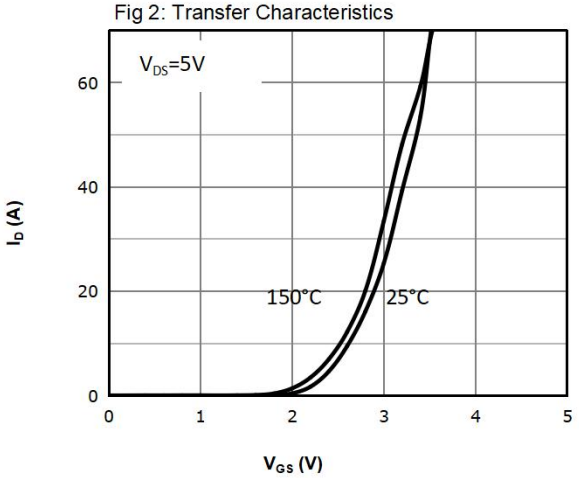


Fig 3: Rds(on) vs Drain Current and Gate Voltage

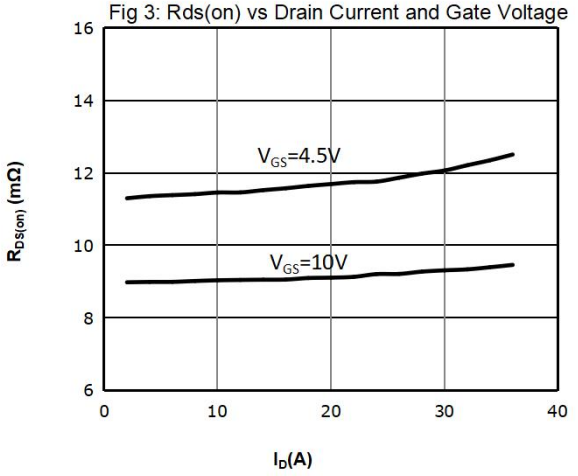


Fig 4: Rds(on) vs Gate Voltage

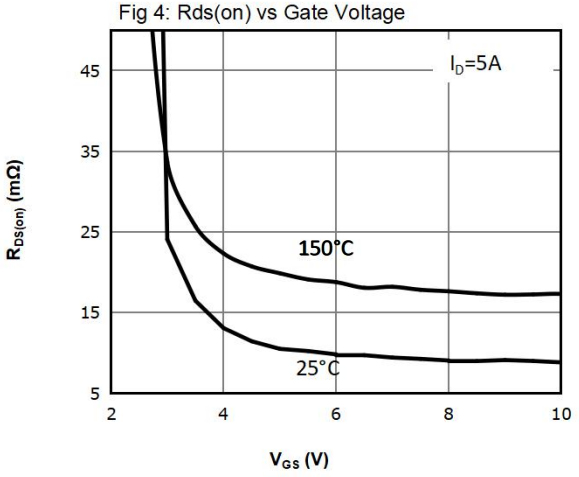


Fig 5: Rds(on) vs. Temperature

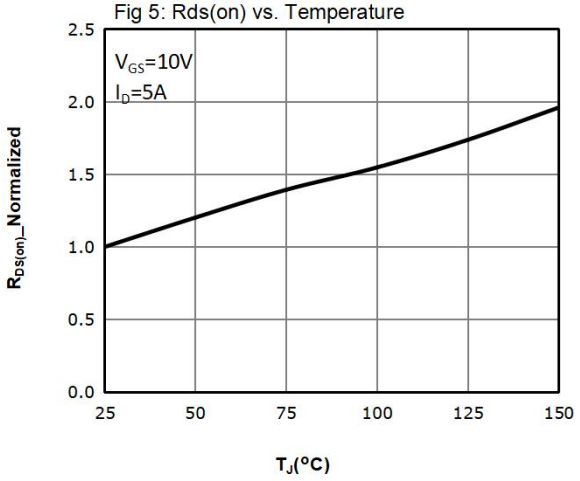


Fig 6: Capacitance Characteristics

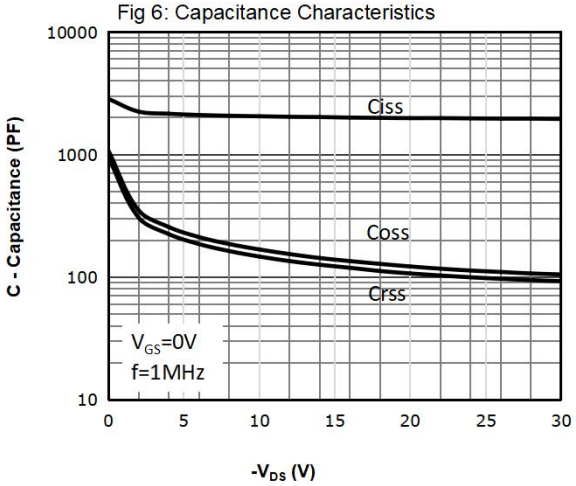


Fig 7: Gate Charge Characteristics

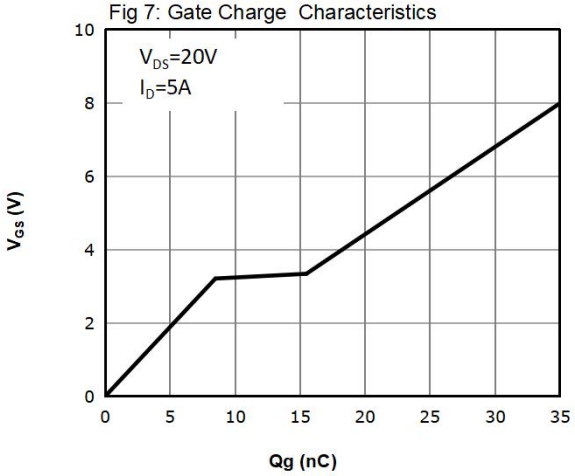


Fig 8: Body-diode Forward Characteristics

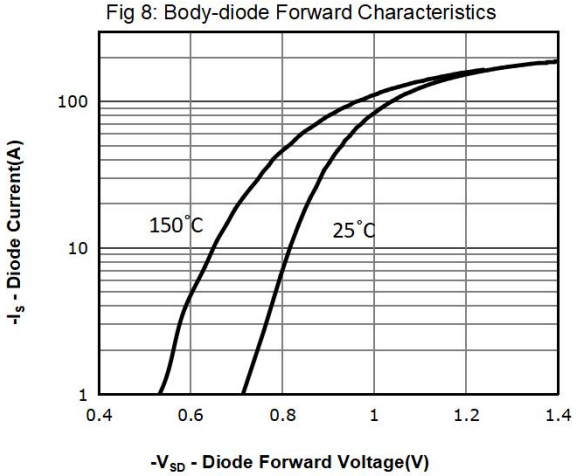


Fig 9: Safe Operating Area

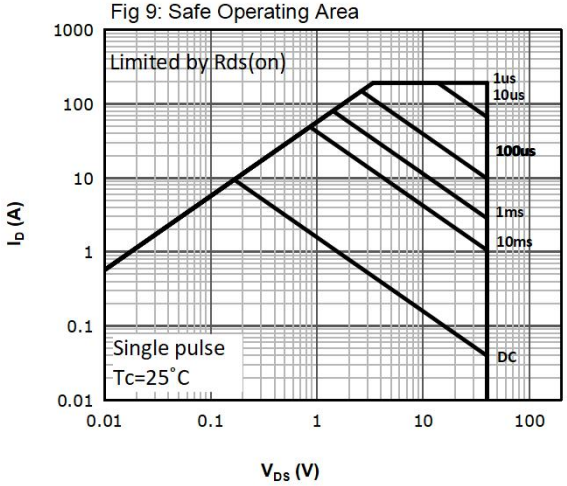
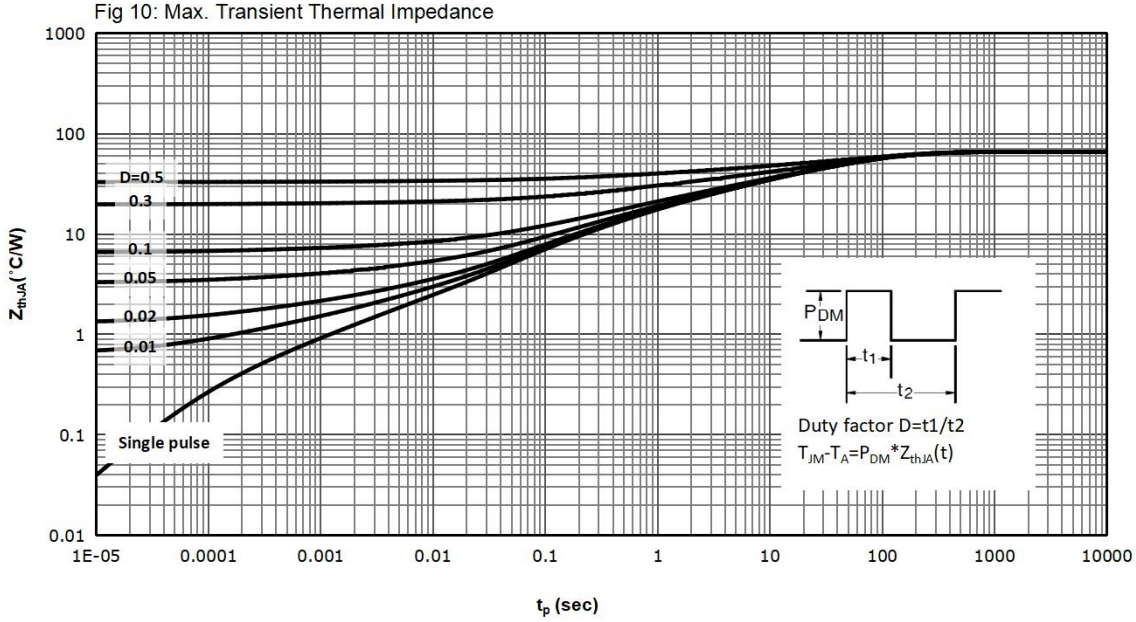
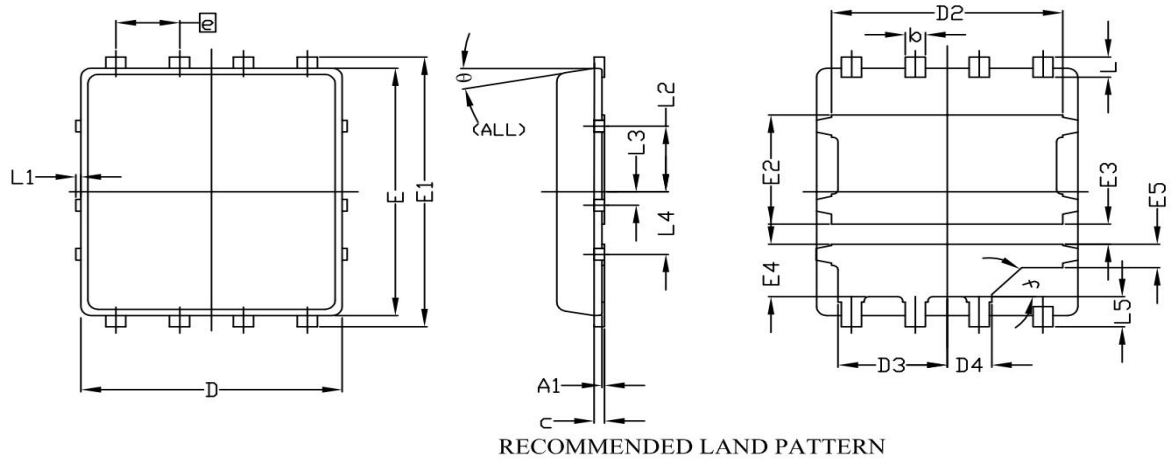


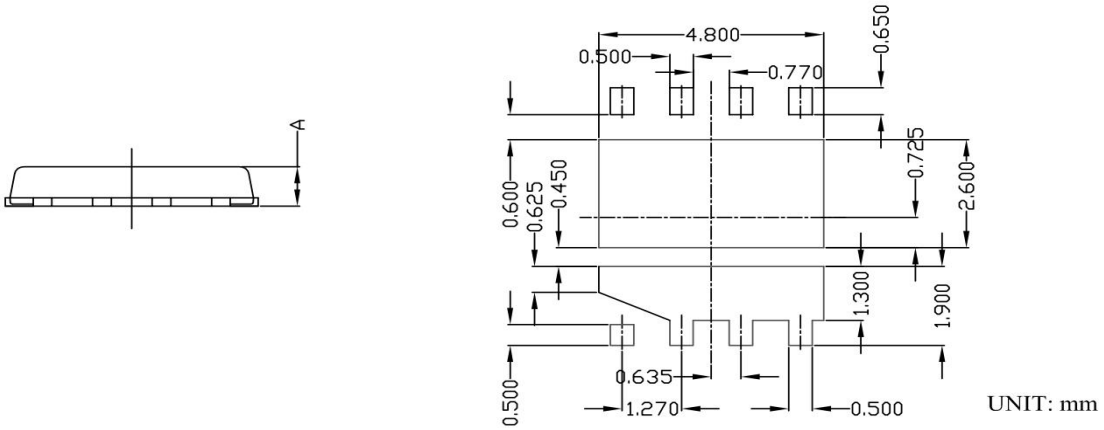
Fig 10: Max. Transient Thermal Impedance



Package Outline: PDFN5x6S



RECOMMENDED LAND PATTERN



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.850	0.900	1.000	0.033	0.035	0.039
A1	0.000	----	0.050	0.000	----	0.002
b	0.350	0.400	0.450	0.014	0.016	0.018
c	0.150	0.200	0.250	0.006	0.008	0.010
D	5.20 BSC			0.205 BSC		
D2	4.500	4.600	4.700	0.177	0.181	0.185
D3	2.125	2.175	2.225	0.084	0.086	0.088
D4	0.835	0.885	0.935	0.033	0.035	0.037
E	5.55 BSC			0.219 BSC		
E1	6.05 BSC			0.238 BSC		
E2	2.400	2.450	2.500	0.094	0.096	0.098
E3	0.400	0.450	0.500	0.016	0.018	0.020
E4	1.125	1.175	1.225	0.044	0.046	0.048
E5	0.475	0.525	0.575	0.019	0.021	0.023
e	1.27 BSC			0.050 BSC		
L	0.350	0.450	0.550	0.014	0.018	0.022
L1	0.000	----	0.100	0.000	----	0.004
L2	1.375	1.475	1.575	0.054	0.058	0.062
L3	0.200	0.300	0.400	0.008	0.012	0.016
L4	1.300	1.400	1.500	0.051	0.055	0.059
L5	0.575	0.675	0.775	0.023	0.027	0.031
f	45°			45°		
θ	0°	----	10°	0°	----	10°

Revision History

Revison	Date	Major changes
1.0	2025/7/21	Release of formal version

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qulified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.

Any and all semicondutor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

This product is suitable for reflow soldering up to 260℃, not very suitable for wave soldering.
The reliability of this product is not guaranteed under specific conditions when accepted by customers.

CRM(CQ) reserves the right to improve product design, function and reliability without notice.