Standard Products

RAD7214-NNJx Power MOSFET Die

Preliminary Data Sheet

July 2014
www.aeroflex.com/MOSFETS

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A passion for performance.

FEATURES

☐ 250Vbreakdown voltage
☐ 2.5 A current rating
☐ 1.2Ω $R_{DS(on)}$
☐ 15nC gate charge
☐ -55°C to +125°C temperature range
☐ Operational Environment radiation testing to MIL-STD-750
  - Total-dose: 100 krad(Si)
  - SEGR/SEB immune to Xe at full rated drain potential
☐ 0.5 SMD
  - Prototype, EMs and Class S
☐ Drop-in compatible with industry standards
☐ Class S MOSFETs built to your custom flow

INTRODUCTION

Aeroflex RAD's new radiation tolerant power MOSFETs are now available in die, seven standard package options and custom packaging for HiRel environments. Applications within military, aerospace, medical, nuclear power generation, high energy physics research laboratories can benefit from the use of this new series of MOSFETs. Aeroflex's Power MOSFETs are radiation tolerant to 100 krad(Si) and SEGR/SEB immune to their full rated breakdown potential.

Operational power losses are minimized by Aeroflex’s ideal combination of low $R_{DS(on)}$ and gate charge. Die size is optimized for maximum current rating while meeting industry norms. These units are suitable for standalone and hybrid applications.

The RAD7214-NNJx Die are well suited for low loss switching applications, such as DC-to-DC Converters and solid-state relays. They are drop-in compatible with industry standards.

ELECTRICAL CHARACTERISTICS (Case temperature (T_c) = 25°C unless otherwise specified)

CHARACTERISTICS		TEST CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
Drain-Source Breakdown Voltage	BVdss	Vgs - 0V, Id = 1mA	250	-	-	V
Gate-Threshold Voltage	Vgs(th)	Vds = Vgs, Id = 1.0mA	2.0	-	4.0	V
Gate-Body Leakage	Igss	Vgs = ±20V	-	-	100	nA
Zero-Gate Leakage	Idss1	Vds = 200V, Vgs = 0V	-	-	25	
Drain Current	Idss2	Vds = 200V, Vgs = 0V, Tc = 125°C	-	-	250	µA
Drain-Source On Resistance	$R_{DS(on)}$	Vgs = 12V, Id = 2.0A	-	-	1.2	ohms
Gate Charge at 12V	Qg(12)	Vgs = 0V to 12V Id = 2.5A Vdd = 125V	-	-	15	nC
Diode Forward Voltage	Vsd	Id = 2.5A, Vgs = 0V	0.6	-	1.8	V
Junction-to-Case	RΘjc	Pending	-	-	-	°C/W

POST-RADIATION ELECTRICAL CHARACTERISTICS

CHARACTERISTICS	TEST CONDITIONS	LIMITS		UNITS
		MIN	MAX	
Drain-Source Breakdown Voltage[3,4] Bvdss	Vgs - 0V, Id = 1mA	250	-	V
Gate-Threshold Voltage[3,4] Vgs(th)	Vgs = Vds, Id = 1.0mA	1.5	4.0	V
Gate-Body Leakage Forward[2,3,4] Igss	Vgs = ±20, Vds = 0V	-	100	nA
Zero-Gate Voltage Drain Current [3,4] Idss	Vgs = 0V, Vds = 20V	-	25	µA
Drain-Source On-Resistance[1,3,4]	Vgs = 12V, Ids = 2.0A	-	1.2	ohms

Notes:* for die products, the maximum current may be limited by packaging
1. Pulse test, 300us max
2. Absolute value
3. Gamma = 100 krad(Si)
4. Gamma irradiation bias at both Vgs = 10V, Vds = 0V and Vgs = 0V, Vds = 80% BVdss

SEE (SINGLE-EVENT-EFFECTS)

CHARACTERISTICS	SYMBOL	ENVIRONMENT[1]				
	ION SPECIES	ENERGY (MeV)	TYPICAL LET (MEv/MG/CM2)	TYPICAL RANGE (u)	APPLIED VGS BIAS (V)	MAX VDS BIAS (V)[2]
Single Event Effects - Safe Operating Area	Kr	906	30	113	-10	250
	Xe	1232	59	99	-5	250

Notes:
1. Fluence = 1E6 ions/^{cm2} (typical), T = 25°C
2. Does not exhibit Single Event Burnout (SEB) or Single Event Gate Rupture (SEGR).

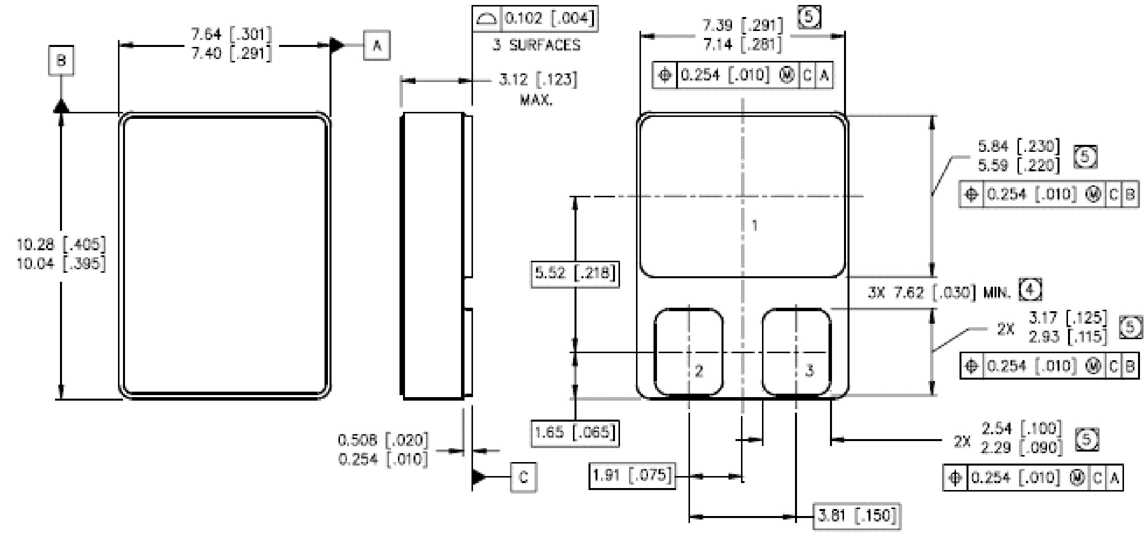
ELECTRICAL TESTING AT WAFER PROBE:

ITEM	VOLTAGE	CURRENT	LOWER LIMIT	UPPER LIMIT	LOWER SPEC	UPPER SPEC	UNIT
igss	Vgs=5V			100			uA
igss	Vgs=20V			100		100	nA
igss	Vgs-30V			1			uA
idss	Vds=200V			2		25	uA
idss	Vds=250V			10		1000	uA
bvdss		Ids=1mA	110		250		V
rdon	Vgs=12V	Ids=0.5A		1200		1200	mΩ
rdon	Vgs=12V	Ids=2A		1200		1200	mΩ
vsd		Isd=2A	0.6	1.2	0.6	1.8	V
vth		Ids=250μA	2.7	3.9	2.00	4.00	V
igssr	Vgs=-20V			100		100	nA
igssr	Vgs=-30V			1			uA
idss	Vds=250V			10			uA
igss	Vgs=20V			100		100	nA

AEROFLEX RAD RAD7214-NNJx PART NUMBERING:

PART #	BREAKDOWN POTENTIAL (V)	$R_{DS(on)}$ (mΩ)	DRAIN CURRENT (A)	GATE CHARGE (nC)	TID LEVEL (krad(SI))	SEE	Die size	PKG	SCREENING
RAD7214-NNJP	**250**	**1200**	**2.5**	**15**	**100**	**Xe**	**1**	**0.5 SMD**	**Prototype**
RAD7214-NNJE	**250**	**1200**	**2.5**	**15**	**100**	**Xe**	**1**	**0.5 SMD**	**EM**
RAD7214-NNJS	**250**	**1200**	**2.5**	**15**	**100**	**Xe**	**1**	**0.5 SMD**	**Space**

Case Outline and Dimensions - SMD-0.5



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

④ DIMENSION INCLUDES METALLIZATION FLASH.

⑤ DIMENSION DOES NOT INCLUDE METALLIZATION FLASH.

PAD ASSIGNMENTS

MOSFET	SCHOTTKY SINGLE DIE	SCHOTTKY DUAL DIE
1 = DRAIN	1 = CATHODE	1 = CATHODE
2 = GATE	2 = COMMON ANODE	2 = ANODE 1
3 = SOURCE	3 = COMMON ANODE	3 = ANODE 2

Aeroflex RAD- Datasheet Definition

Advanced Datasheet - Product In Development

Preliminary Datasheet - Shipping Prototypes

Datasheet - Class S Compliant, QML or JAN

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