

Rad Hard GaN from EPC Space

Sean Morrison
Vice President of Business Development

- EPC Space is a Rad Hard GaN-on-Si transistor and GaN IC company whose sole focus is to service the HiRel and Space markets
- EPC Space offers a High Reliability Rad Hard GaN-on-Si transistors and GaN IC technology which provides better performing and more cost effective solutions for Satellite and other Hi-Rel applications



- Smaller Size
- Lighter Weight
- Better Electrical Performance – Our FOM (Gate charge x $R_{DS(ON)}$) is the industry leader
- Much more Cost Effective
- Overall Best Value – when you combine size, weight, performance, and price, the future is GaN



- Since 2017 over 100,000 Radiation Hardened EPC SPACE GaN HEMT power devices are flying successfully in various orbits from LEO to GEO
- Over 5000 devices in GEO

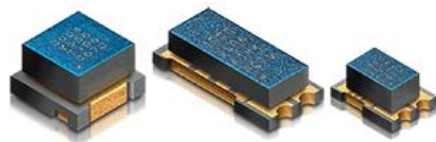


- Parts are qualified to an equivalent MIL-PRF-19500 JANS flow including Conformance Inspection of groups A, B, C, D, E
- Every wafer is tested for SEE performance and every lot is qualified for TID
- Use of “Flip-Chip” (no wire-bonds) technology in assembly for additional reliability
- Long Term reliability > 2000 Hours of HTRB and HTGB
- 2000 Hours of switching reliability in Hard Switch configuration 100kHz to 500kHz.
- PoF (physics of failure) testing has been performed



FBG Series

High Reliability Ceramic Discretes



CDA Series

High Reliability Die Adaption Product



“GaN Driving GaN Technology”

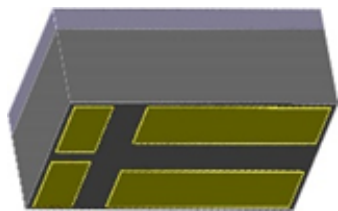
FBS-GAM Series

Ultra fast Low-side eGaN drivers

Ultra fast Dual Low-side eGaN drivers

High/low-side Half bridge with integrated HEMT Power Switches

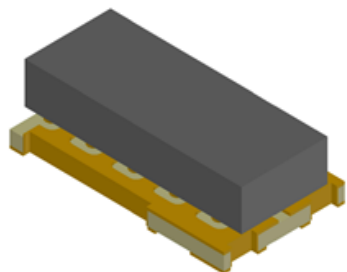
[Commerce 9A515.e.1](#)



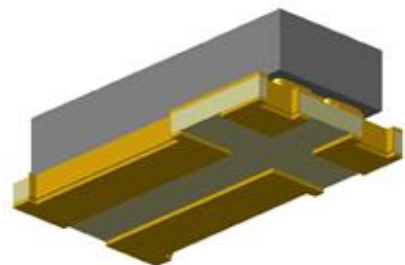
FSMD-B

FBS Part number	V _{DS} (V)	I _D (A)	R _{DS(ON)} (mΩ)	Q _G (nC)	Package style	Package dimensions L x W x H inches
FBG04N08AX	40	8	24	3	FSMD-A	0.130 x 0.130 x 0.130
FBG10N05AX	100	5	44	3	FSMD-A	0.130 x 0.130 x 0.130
FBG20N04AX	200	4	102	2	FSMD-A	0.130 x 0.130 x 0.130
FBG04N30BX	40	30	6	13	FSMD-B	0.220 x 0.150 x 0.081
FBG10N30BX	100	30	10	11	FSMD-B	0.220 x 0.150 x 0.081
FBG20N18BX	200	18	26	9.8	FSMD-B	0.220 x 0.150 x 0.081
FBG30N04CX	300	4	404	2.2	FSMD-C	0.170 x 0.170 x 0.081

- Ultra Low Total Gate Charge
- Very Low R_{DSON}
- Industry Lowest FOM
- Small AlN Package with good Thermal
- Total Ionizing Dose Immune
- SEE Immune up to a LET of 83 at 100% VDS rating
- Neutron up to 4E15 Neutron/cm²



FBS Part number	V _{DS} (V)	I _D (A)	R _{DS(ON)} (mΩ)	Q _G (nC)	Package style	Package dimensions L x W x H inches
CDA04N08X2	40	8	16	3	CDA-2	0.091 x 0.067 x 0.047
CDA10N05X2	100	5	30	3	CDA-2	0.091 x 0.067 x 0.047
CDA20N04X4	200	4	100	2	CDA-4	0.091 x 0.060 x 0.047
CDA04N30X1	40	30	5	13	CDA-1	0.188 x 0.088 x 0.047
CDA10N30X1	100	30	9	11	CDA-1	0.188 x 0.088 x 0.047
CDA20N18X3	200	18	25	9.8	CDA-3	0.164 x 0.088 x 0.047
CDA30N04X7	300	4	404	2.2	CDA-7	0.100 x 0.100 x 0.047



CDA-1

- Ultra Low Total Gate Charge
- Very Low R_{DS(ON)}
- Industry Lowest FOM
- Ease of handling for hybrid and restricted board space
- Total Ionizing Dose Immune
- SEE Immune up to a LET of 83 at 100% VDS rating
- Neutron up to 4E15 Neutron/cm²

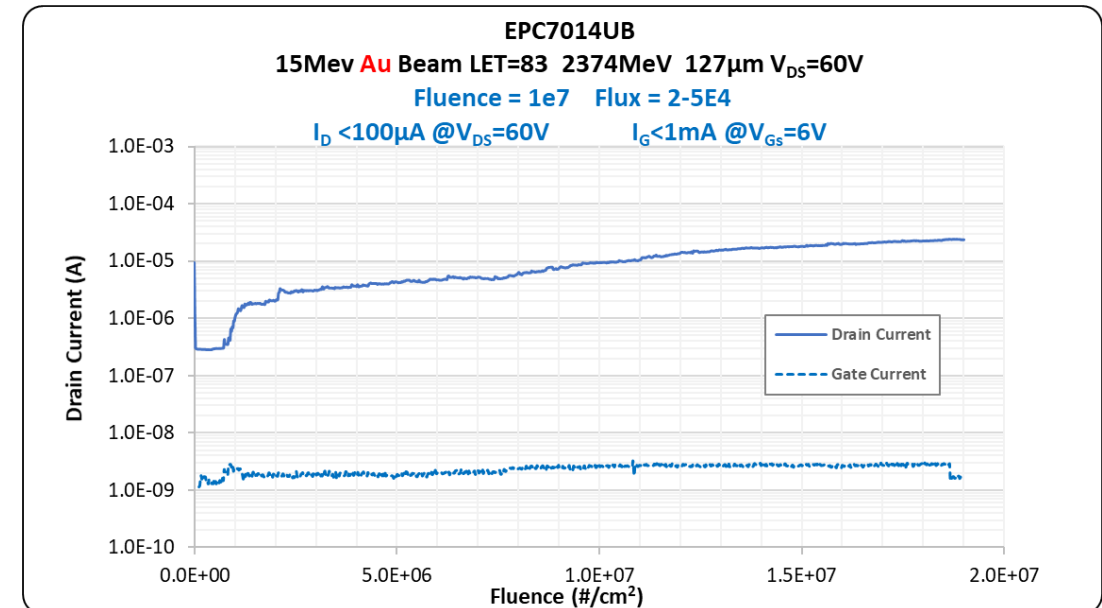
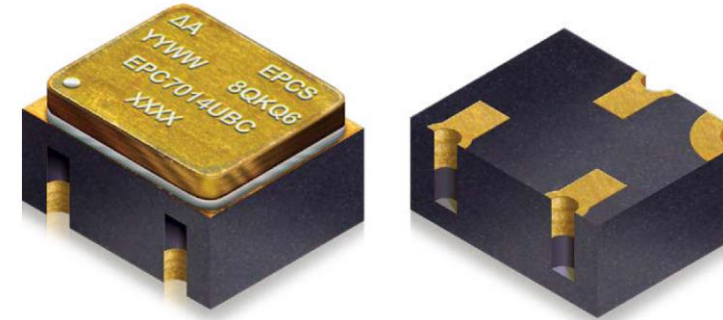
EPC7014UB 60V, 1A RAD HARD GaN

Features

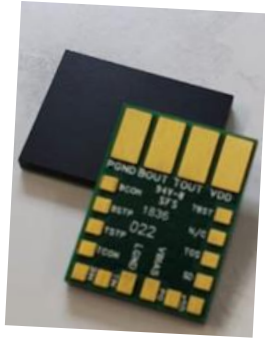
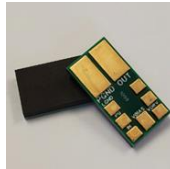
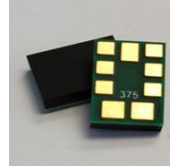
- Ultra Low Q_G For High efficiency
- Fast Switching
- Shielded Metal Lid
- Light weight 0.058 grams

Radiation Tolerance

- 1000 krad
- SEE LET = 83MeV·cm²/mg at $V_{DS} = 60V$
- Neutron 3E15 Neutron/cm²



Module Products

Part Number	Description	Export Classification	Package
FBS-GAM02-P-R50	Radiation Hardened 50V, 10A Half-Bridge Multi-function Driver/Logic/integrated output Power GaN HEMTs	9A515.e.x	
FBS-GAM02P-R-PSE	Radiation Hardened 50V Half-Bridge Multi-function Driver/Logic for use with external power GaN HEMTs		
FBS-GAM04-P-R50	Radiation Hardened 50V/10A Dual low-side Driver/Logic/integrated output power GaN HEMTs		
FBS-GAM04-P-R100	Radiation Hardened 100V/10A Dual low-side Driver/Logic/integrated output power GaN HEMTs		
FBS-GAM01-P-R50	50V, 12A Radiation Hardened High Speed GaN based Single Output Low Side Driver with integrated output 100V Power GaN HEMTs		
FBS-GAM01P-R-PSE	Radiation Hardened Single Output High Speed GaN based Low Side Driver		

- DLA Site Certification: CY2022
- Next Gen, EPC7 Series: some devices already released, more devices will be launched throughout CY 2022
 - This next generation of RH GaN devices have been specifically designed for high radiation environments (TID, SEE, Neutron) and low dynamic on-resistance. Initial results have demonstrated “marked” improvements in these areas over all prior generation of GaN-on-Si devices.
- QPL Products: CY 2023
- RH GaN IC's: CY2023

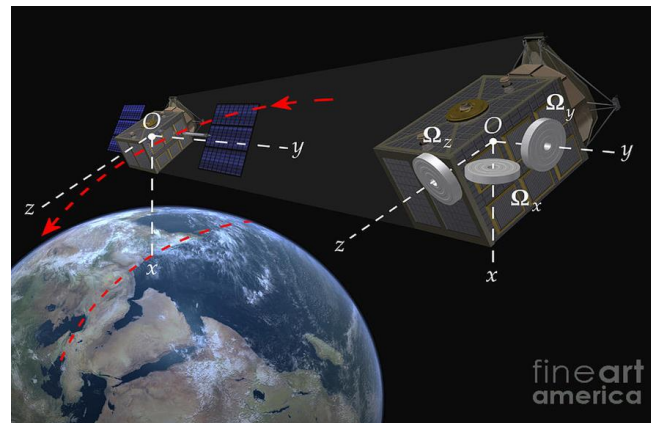


PROGRESS IN SPACE IS ACHIEVABLE TODAY WITH EPC SPACE RAD HARD GaN DEVICES!!

Lidar



Motor Drive



Ion Thruster

