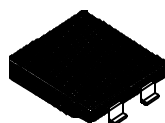


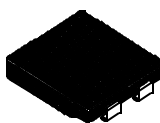
MX043J
MX043G

Features

- Harris FSC260R die
- total dose: 100 kRAD(Si) within pre-radiation parameter limits
- dose rate: 3×10^9 RAD(Si)/sec @ 80% V_{DSS} typical
- dose rate: 2×10^{12} RAD(Si)/sec @ $ID \leq IDM$ typical
- neutron: 10^{13} neutrons/cm² within pre-radiation parameter limits
- photocurrent: 17 nA/RAD(Si)/sec typical
- rated Safe Operating Area Curve for Single event Effects
- rugged polysilicon gate cell structure with ultrafast body diode
- low inductance surface mount power package available with "J-leads" (MX043J) or "gullwing-leads" (MX043G)
- very low thermal resistance
- reverse polarity available upon request add suffix "R" st



MX043G



MX043J

200 Volts
44 Amps
50 mW

**RADIATION
 HARDENED
 SEGR-RESISTANT
 N-CHANNEL
 ENHANCEMENT
 MODE
 POWER MOSFET**

Maximum Ratings @ 25°C (unless otherwise)

DESCRIPTION	SYMBOL	MAX.	UNIT
Drain-to-Source Breakdown Voltage (Gate Shorted to Source) @ $T_J \geq 25^\circ\text{C}$	BV_{DSS}	200	Volts
Drain-to-Gate Breakdown Voltage @ $T_J \geq 25^\circ\text{C}$, $R_{GS} = 1 \text{ M}\Omega$	BV_{DGR}	200	Volts
Continuous Gate-to-Source Voltage	V_{GS}	+/-20	Volts
Transient Gate-to-Source Voltage	V_{GSM}	+/-30	Volts
Continuous Drain Current $T_J = 25^\circ\text{C}$ $T_J = 100^\circ\text{C}$	I_{D25} I_{D100}	44 28	Amps
Peak Drain Current, pulse width limited by T_{Jmax}	I_{DM}	132	Amps
Repetitive Avalanche Current	I_{AR}	44	Amps
Repetitive Avalanche Energy	E_{AR}	tbd	mJ
Single Pulse Avalanche Energy	E_{AS}	tbd	mJ
Power Dissipation	P_D	300	Watts
Junction Temperature Range	T_J	-55 to +125	°C
Storage Temperature Range	T_{stg}	-55 to +125	°C
Continuous Source Current (Body Diode)	I_S	44	Amps
Pulse Source Current (Body Diode)	I_{SM}	132	Amps
Thermal Resistance, Junction to Case	θ_{JC}	0.25	°C/W
Weight	-		grams

SINGLE EVENT EFFECTS SAFE OPERATING AREA (SEESO)

Ion Species	typical LET (MeV/mg/cm)	typical range (μ)	VGS	VDSmax
Ni	26	43	-20V	200V
Br	37	36	-5V	200V
Br	37	36	-10V	160V
Br	37	36	-15V	100V
Br	37	36	-20V	40V

Notes

- (1) Pulse test, $t \leq 300 \text{ ms}$, duty cycle $d \leq 2\%$
- (2) Microsemi Corp. does not manufacture the mosfet die; contact company for details.

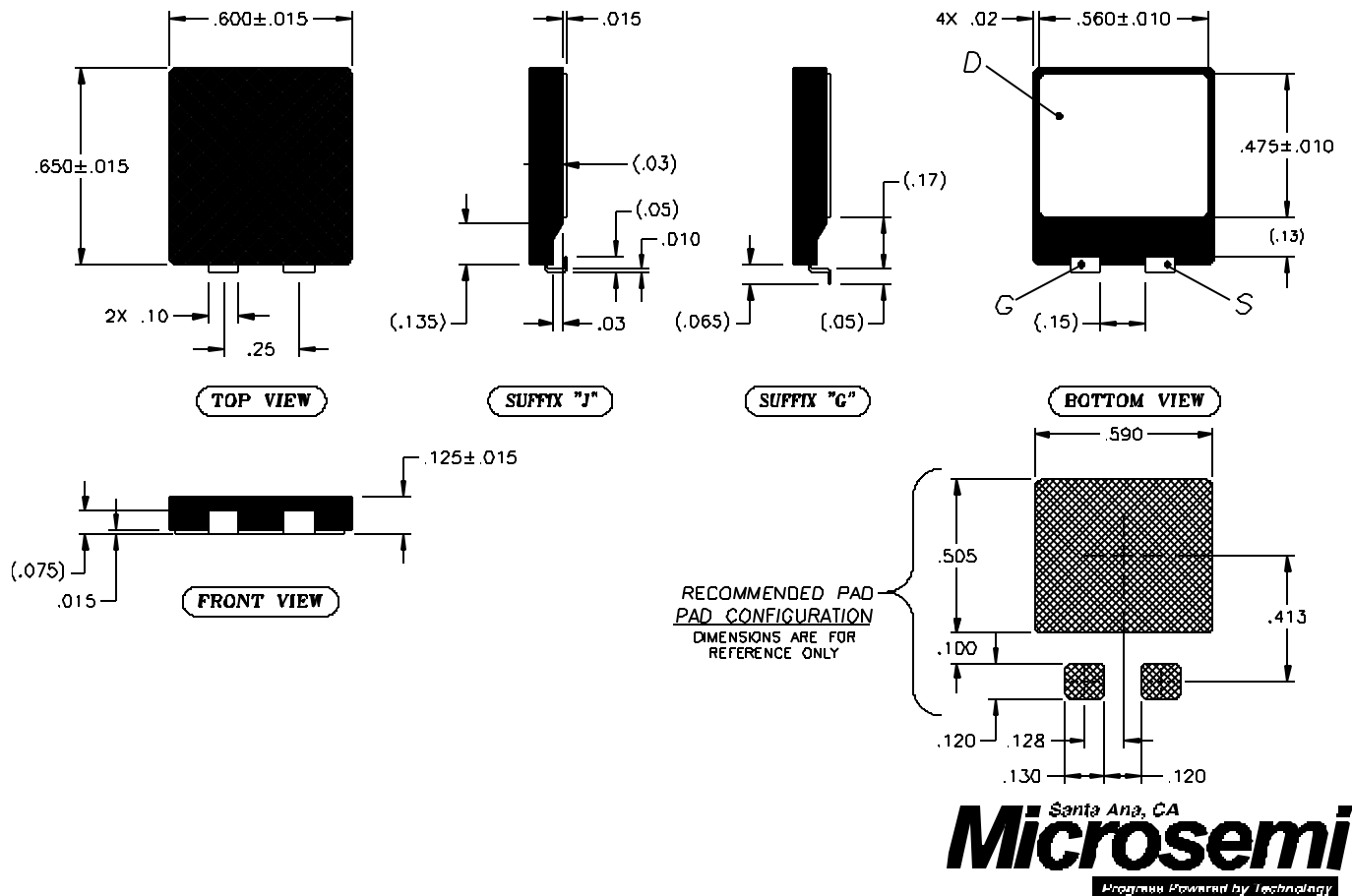
MX043J
MX043G

Electrical Parameters @ 25°C (unless otherwise specified)

DESCRIPTION	SYMBOL	CONDITIONS	MIN	TYP.	MAX	UNIT
Drain-to-Source Breakdown Voltage (Gate Shorted to Source)	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	200			V
Temperature Coefficient of the Drain-to-Source Breakdown Voltage	$\Delta BV_{DSS}/\Delta T_J$			tbd		V/°C
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1\text{ mA},$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = -55^\circ\text{C}$	1.5 0.5 -		4.0 - 5.0	V V V
Gate-to-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{ V}_{DC}, V_{DS} = 0$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			± 100 ± 200	nA
Drain-to-Source Leakage Current (Zero Gate Voltage Drain Current)	I_{DSS}	$V_{DS} = 0.8 \cdot BV_{DSS}$ $V_{GS} = 0\text{ V}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			25 250	μA μA
Static Drain-to-Source On-State Resistance (1)	$R_{DS(on)}$	$V_{GS} = 12\text{ V}, I_D = 28\text{ A}$ $I_D = 25\text{ A}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		0.043 -	0.050 0.093	Ω Ω
Forward Transconductance (1)	g_{fs}	$V_{DS} \geq 10\text{ V}; I_D = 50\text{ A}$	26	32		S
Input Capacitance Output Capacitance Reverse Transfer Capacitance	C_{iss} C_{oss} C_{rss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		4400 900 280		pF
Turn-on Delay Time Rise Time Turn-off Delay Time Fall Time	$T_{d(on)}$ t_r $t_{d(off)}$ t_f	$V_{GS} = 12\text{ V}, V_{DS} = 100\text{ V},$ $I_D = 44\text{ A}, R_G = 2.35\ \Omega$			40 95 100 25	ns
Total Gate Charge Gate-to-Source Charge Gate-to-Drain (Miller) Charge	$Q_{g(on)}$ Q_{gs} Q_{gd}	$V_{GS} = 12\text{ V}, V_{DS} = 100\text{ V}, I_D = 44\text{ A}$		160 30 83	180 38 93	nC
Body Diode Forward Voltage (1)	V_{SD}	$I_F = I_S, V_{GS} = 0\text{ V}$	0.6	-	1.8	V
Reverse Recovery Time (Body Diode)	t_{rr}	$I_F = 10\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$			560	ns

Mechanical Outline

ShelfFit™



100% KND (Known-Good-Die) SCREENING

- 100% die probe at $T_{\text{ambient}} = 25^{\circ}\text{C}$ for BVDSS, $V_{\text{GS}_{\text{th}}}$, IDSS, IGSS, VSD, $R_{\text{DS}_{\text{on}}}$
- 100% Visual Inspection i.a.w. method 2072 of MIL-STD-750

DIE ELEMENT EVALUATION

- Wafer Lot Evaluation Testing (WLAT) i.a.w. method 5001 of MIL-STD-750, including SEM
- Unclamped Inductive Switching (I_{AS}) i.a.w. method 3470 of MIL-STD-750 at $V_{\text{GS}_{\text{peak}}} = 15 \text{ V}$, $L = 100 \mu\text{H}$, $I_{\text{AS}} = 132 \text{ A}$
- Gate Stress Test for $250 \mu\text{s}$ at $V_{\text{GS}} = 30 \text{ Vdc}$.
- Safe Operating Area i.a.w. method 3474 of MIL-STD-750 at $V_{\text{DS}} = 160 \text{ V}$, $I_{\text{D}} = 2.8 \text{ A}$ for 10 ms
- High Temperature Gate Bias i.a.w. method 1042 cond.B of MIL-STD-750: 48 hrs at $T_{\text{ambient}} = 150^{\circ}\text{C}$, Drain shorted to Source and $V_{\text{GS}} = 16 \text{ V}$
- High Temperature Reverse Bias i.a.w. method 1042 cond.A of MIL-STD-750: 240 hrs at $T_{\text{ambient}} = 150^{\circ}\text{C}$, Gate shorted to Source and $V_{\text{DS}} = 160 \text{ V}$
- Final DC Electrical Testing at $T_{\text{ambient}} = 25^{\circ}\text{C}$, 125°C and -55°C
- Temperature Cycling i.a.w. method 1051 of MIL-STD-750, 100 cycles, -55°C to $+150^{\circ}\text{C}$
- Group A Electrical Testing including dynamic parameters
- Steady State Operational Life Bias i.a.w. method 1042 cond.A of MIL-STD-750: 1000 hrs at $T_{\text{ambient}} = 150^{\circ}\text{C}$, Gate shorted to Source and $V_{\text{DS}} = 160 \text{ V}$
- Final DC Electrical Testing at $T_{\text{ambient}} = 25^{\circ}\text{C}$, 125°C and -55°C
- Die Attach Evaluation i.a.w. method 2017 of MIL-STD-750
- Bond Strength Evaluation i.a.w. 2037 of MIL-STD-750

RADIATION EVALUATION

Total Dose Irradiation i.a.w. method 1019 of MIL-STD-750, dose= 100 kRAD, Drain shorted to Source, $V_{\text{GS}} = 10\text{V}$
 Total Dose Irradiation i.a.w. method 1019 of MIL-STD-750, dose= 100 kRAD, Gate shorted to Source, $V_{\text{DS}} = 160\text{V}$
 Evaluation criteria: no degradation of the DC electrical parameters exceeding the data sheet limits allowed after total dose irradiation.

100% SCREENING

- a. Internal Visual (Precap) Inspection i.a.w. method 2069 and 2072 of MIL-STD-750
- b. Temperature Cycling i.a.w. method 1051 of MIL-STD-750, 10 cycles, -55°C to +125°C
- c. Thermal Response i.a.w. method 3161 of MIL-STD-750
- d. High Temperature Gate Bias i.a.w. method 1042 cond.B of MIL-STD-750: 24 hrs at $T_{\text{ambient}} = 125^{\circ}\text{C}$, Drain shorted to Source and $V_{\text{GS}} = 16\text{ V}$
- e. High Temperature Reverse Bias i.a.w. method 1042 cond.A of MIL-STD-750: 24 hrs at $T_{\text{ambient}} = 125^{\circ}\text{C}$, Gate shorted to Source and $V_{\text{DS}} = 160\text{ V}$
- f. Final electrical Testing i.a.w. this data sheet (100% DC parameters @ 25°C and sample (22/0) testing for dynamic parameters and DC parameters @ temperature extremes)

QUALIFICATION INSPECTION

- a. Thermal Resistance i.a.w. method 3161 of MIL-STD-750 - sample size= 10 devices/0 rejects
- b. Solderability i.a.w. method 2026 of MIL-STD-750 - sample size= 10 devices/0 rejects
- c. Temperature Cycling i.a.w. method 1051 of MIL-STD-750, 200 cycles, -55°C to +125°C - sample size 10 devices/0 rejects
- d. Intermittent Operation Life i.a.w. method 1042D of MIL-STD-750 with $\Delta T_j = 75^{\circ}\text{C}$ for 2000 cycles (monitoring thermal response shift) - sample= 25 devices/0 rejects
- e. Steady State Operation Life i.a.w. method 1042A of MIL-STD-750 at $T_j = 115^{\circ}\text{C}$ min. for 1000 hrs - sample= 25 devices/0 rejects
- f. Steady state Gate Life i.a.w. method 1042B of MIL-STD-750 at $T_j = 115^{\circ}\text{C}$ min. for 1000 hrs. - sample= 25 devices/0 rejects
- g. Safe Operating Area i.a.w. method 3474 of MIL-STD-750 (monitoring thermal response shift) - sample size= 10 devices/0 rejects
- h. Shock i.a.w. method 2016 of MIL-STD-750 - sample size= 10 devices/0 rejects
- i. Vibration i.a.w. method 2056 of MIL-STD-750 - sample size= 10 devices/0 rejects
- j. Acceleration i.a.w. method 2006 of MIL-STD-750 - sample size= 10 devices/0 rejects
- k. X-ray, one view of the die attach area (Oz axis) - sample= 10 devices/0 rejects
- l. Humidity ????? - sample size= 5 devices/0 rejects