SSSD RADIATION TOLERANT P-CHANNEL MOSFETS

JANS CERTIFIED | ISO 9001 & AS9100 CERTIFIED

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- Sales Representatives / Contactback cover

SSDI is JANS certified / ISO 9001 and AS9100 certified

SSDI is a world-renowned leader in the design and manufacture of semiconductors, assemblies, and modules. As a pioneer semiconductor manufacturer for over 55 years, SSDI has earned and maintained a reputation for setting the highest standards of reliability and performance. This reputation has been built upon unsurpassed technology and quality in the areas of high density/high power and high voltage discrete semiconductors and modules.



ISO 9001 & AS9100 Certified



JANS Certified

SSDI currently owns three properties within a 3-mile area in the city of La Mirada, California



Firestone Facility



Knott Facility



Wafer Fab Facility

For additional information and data sheets:

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Rad Tolerant PFET Solutions for HiRel Programs

SSDI Delivers HiRel Product Innovation & Solutions for New / Legacy Designs



3H FOCUS

- 50+ years serving the HiRel market
- JANS certified
- ISO 9001 / AS9100 certified
- Developing new, innovative products with performance not matched by other manufacturers' products
- Exploring new technology (e.g. GaN, SiC,

DESIGN & PACKAGING FLEXIBILITY

- Target specific electrical characteristics to satisfy customer requirements
- Wide range of packaging options from surface mount to legacy packages
- Improve density of board design which leads to overall system cost improvements

SOLUTIONS

- Broad capabilities: catalog showcases capability, not limited to current offerings
- Offer replacements for most products from competitors (e.g. Microsemi, Infineon / IR, TI, Siliconix, etc.)
- Sustainment: support for the life of programs; work with customer to accommodate small to medium quantities

LESS IS MORE: Simplify Design & Optimize Board Space

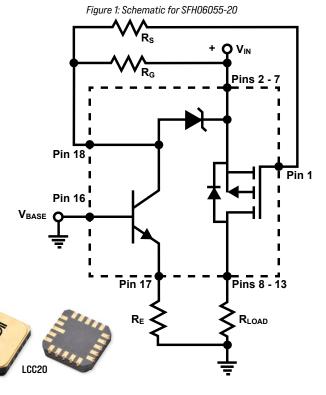
SSDI developed a radiation tolerant high side power switch, SFH06055-20, to replace 3 components for a space application. SSDI combined a low on-resistance P-channel MOSFET, a Zener diode to set a consistent gate threshold voltage, and a small signal, fast switching NPN transistor driver in the LCC20 package. By incorporating three devices into one ceramic, surface mount package, the SFH06055-20 can simplify the design and optimize board space. SSDI worked with the customer to configure the layout to meet their specific requirements (Figure 1).



SFH06055-20

20 A, 60 V, 51 m Ω typ Radiation Tolerant High Side Power Switch

- Low RDS(on) MOSFET (SFF22P06) with gate voltage setting Zener diode and a small signal, fast switching NPN transistor driver
- Logic level input voltage
- Resistors can be added internally
- Switches electrical loads



Rad Tolerant P-Channel MOSFETs: < 100 V



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Part Number (Industry Part Number)	Features / Advantages	V _{DSS} (V)	I _D (A)	R _{DS(ON) typ} (mΩ)	$R_{DS(ON) max}$ (m Ω)	P _D (W)	Q _{G typ @ 10 V} (nC)	V _{GS(th) max}	Package	Data Sheet
SFF60P05M	 Low RDS(on) and high transconductance Fast switching speed Fast recovery and superior dv/dt performance Low input and transfer capacitance for easy paralleling 	50	60	21	33	156	200	4	T0-254	FP0045
SFF60P05Z	Low RDS(on) and high transconductance Fast switching speed Fast recovery and superior dv/dt performance Low input and transfer capacitance for easy paralleling	50	60	21	33	156	200	4	T0-254Z	FP0045
SFL11P06S.22* (IRHLUB7970Z4, JANSR2N7626UB)	 Fast switching speed Low total gate charge 5 V TTL / CMOS compatible operation Simple drive Ceramic surface mount package 	60	11	70	85	10.4	7 (@5V)	2.5	SMD.22	FT0098
SFL22P06S.5* (IRHLNJ797034, JANSR2N7624U3)	 Fast switching speed Low total gate charge 5 V TTL / CMOS compatible operation Simple drive Ceramic surface mount package 	60	22	78	89	40	7 (@ 5 V)	2.5	SMD.5	FT0088
SFL40P06S.5 * (IRHNJ9A7034, JANSR2N7647U3)	 Low RDS(on) Fast switching Low total gate charge Avalanche rated Rugged trench technology Ceramic surface mount package 	60	40	30	39	63	50	3	SMD.5	FT0099

^{*}LET = 61.3 MeV up to rated voltage (planning to test further when additional beam time is available)



Rad Tolerant P-Channel MOSFETs: 100 V

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Part Number (Industry Part Number)	Features / Advantages	V _{DSS} (V)	I _D (A)	R _{DS(ON) typ} (mΩ)	R _{DS(ON) max} (mΩ)	P _D (W)	Q _{G typ @ 10 V} (nC)	V _{GS(th) max}	Package	Data Sheet
SFF9130-28D (IRF9130 types)	I ■ Fast switching speed		11	-	350	36	26	4	LCC28	FP0025
SFF9130J (IRF9130 types)	I ■ Fast switching sneed		11	-	350	50	26	4	T0-257	FP0025
SFF9130M (IRF9130 types)	Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability	100	11	-	350	63	26	4	T0-254	FP0025
SFF9130S.5 (IRHNJ9130)	Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability	100	11	-	350	63	26	4	SMD.5	FP0025
SFF9130Z (IRF9130 types)	Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability	100	11	-	350	63	26	4	T0-254Z	FP0025
SFF12P10S.22 (IRHNJ597130, JANS2N7545U3)	 Fast switching speed Low total gate charge Simple drive Ceramic surface mount package / small footprint 	100	12	145	160	20	8	4	SMD.22 (Available in SMD.5)	FT0113
SFF9140/3 (IRF9140 types)	Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability	100	18	-	230	125	50	4	T0-3	FP0021
SFF9140-28 (IRF9140 types)	Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability	100	18	-	230	36	50	4	LCC28	FP0011
SFF9140J (IRF9140 types)	Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability	100	18	-	230	63	50	4	T0-257	FP0015

Rad Tolerant P-Channel MOSFETs: 100 V



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Part Number (Industry Part Number)	Features / Advantages	V _{DSS} (V)	I _D	R _{DS(ON) typ} (mΩ)	R _{DS(ON) max} (mΩ)	P _D (W)	Q _{G typ @ 10 V} (nC)	V _{GS(th) max}	Package	Data Sheet
SFF9140M (IRF9140 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	100	18	-	230	63	50	4	T0-254	FP0017
SFF9140Z (IRF9140 types)	Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability	100	18	-	230	63	50	4	T0-254Z	FP0017
SFF20P10J (IRF9140 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability Low total gate charge 	100	20	150	230	100	55	4	T0-257	FT0012
SFF9140G (IRF9140 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	100	23	135	180	125	43	4	Cerpack	FT0102
SFF9140S.5 (IRHNJ9130; IRF9140 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	100	23	135	180	125	43	4	SMD.5	FT0102
SFF25P10S.3 (IRHNJ597130; JANS2N7545U3)	 Fast switching speed Low total gate charge Simple drive Ceramic surface mount package / small footprint 	100	25	62	70	40	17	4	SMD.3 (Available in SMD.5)	FT0114
SFF9150S1 (IRHN9150; JANS2N7422U)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	100	45	47	85	125	75 (@ 12 V)	4	SMD1	FT0101
SFF75P10S2 (IRHNA597160; JANSR2N7550U2)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	100	75	30.5	45	250	165 (@ 12 V)	4	SMD2	FT0103



Rad Tolerant P-Channel MOSFETs: 200 V Sorted by In

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Part Number (Industry Part Number)	Features / Advantages	V _{DSS} (V)	I _D	R _{DS(ON) typ} (mΩ)	$R_{DS(DN) max}$ (m Ω)	P _D (W)	Q _{G typ @ 10 V} (nC)	V _{GS(th) max}	Package	Data Sheet
SFF9230M (IRF9240 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	200	6.5	500	800	63	31 (@ 15 V)	4	T0-254	FP0029
SFF9230Z (IRF9240 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	200	6.5	500	800	63	31 (@ 15 V)	4	T0-254Z	FP0029
SFF9240/3 (IRF9240 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	200	9.3	350	500	125	38 (@ 15 V)	4	T0-3	FP0009
SFF9240-28 (IRF9240 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	200	11	350	500	36	38	4	LCC28	FP0007
SFF9240J (IRF9240 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	200	11	350	500	63	38 (@ 15 V)	4	T0-257	FP0001
SFF9240M (IRF9240 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	200	11	350	500	74	38	4	T0-254	FP0003
SFF9240Z (IRF9240 types)	 Rugged construction with poly silicon gate Fast switching speed Excellent high temperature stability 	200	11	350	500	74	38	4	T0-254Z	FP0003

Rad Tolerant P-Channel MOSFETs: 200 V



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Part Number (Industry Part Number)	Features / Advantages	V _{DSS} (V)	I _D (A)	R _{DS(ON) typ} (mΩ)	$R_{DS(ON) max}$ (m Ω)	P _D (W)	Q _{G typ @ 10 V} (nC)	V _{GS(th) max}	Package	Data Sheet
SFF25P20M	 Rugged construction with poly silicon gate Low RDS(on) UIS (unclamped inductive switching) rated 	200	25	150	-	250	150	5	T0-254	FT0009
SFF50P20M	 PolarMOS technology Low RDS(on) Avalanche rated Low total gate charge Fast switching 	200	50	90	100	250	115	4	T0-254	FT0106
SFF50P20Z	 PolarMOS technology Low RDS(on) Avalanche rated Low total gate charge Fast switching 	200	50	90	100	250	115	4	T0-254Z	FT0106
SFF65P20S2 (IRHNA5S97260, IRHNA597260, IRHNA9260, JANS2N7549U2, JANS2N7426U2)	 PolarMOS technology Low RDS(on) Avalanche rated Low total gate charge Fast switching 	200	65	80	85	360	85	4	SMD2	FT0100

HOW SSDI RESCUES PROGRAMS FROM:

RELIABILITY ISSUES

- Offer up to JANS level / equivalent S level screening
- 2 JANS certified facilities in the USA
- 50+ years supporting aerospace & defense applications
- In-house screening capabilities

 (additional screening options to match mission specs)

SUPPLY ISSUES

- Offer replacements for most products from competitors (e.g. Microsemi, Infineon / IR, TI, Siliconix, etc.)
- Maintain materials inventory (work with customer to forecast future orders)
- Shorter lead times (TX, TXV, and S level equivalent screening - offering faster delivery than out of stock QPL devices awaiting approval)
- Work with customer to accommodate small orders

PERFORMANCE ISSUES

- Design flexibility (target key electrical characteristics to match mission specs)
- Packaging flexibility (improve density of board design which leads to overall system cost improvements)
- Build to data sheets & SCDs
- Product development (offer higher performance than standard, generic products)



Cross References: Rad Tolerant P-Channel MOSFETs

SUSTAINMENT SUPPORT

Broad capabilities to replace most competitors' parts - also support customer drawings and specific screening requirements

2. Juliu Julius in indicate i	noot compotitoro parte	also support customer drawings and specific	oorooming roquiron	
Industry Part Number	SSDI Part Number	Description	Package*	Data Sheet
IRF9130 types	SFF9130-28D	11 A, 100 V, 350 mΩ max	LCC28	FP0025
IRF9130 types	SFF9130J	11 A, 100 V, 350 mΩ max	T0-257	FP0025
IRF9130 types	SFF9130M	11 A, 100 V, 350 mΩ max	T0-254	FP0025
IRF9130 types	SFF9130Z	11 A, 100 V, 350 mΩ max	T0-254Z	FP0025
IRF9140 types	SFF20P10J	20 A, 100 V, 150 mΩ typ	T0-257	FT0012
IRF9140 types	SFF9140/3	18 A, 100 V, 230 mΩ max	T0-3	FP0021
IRF9140 types	SFF9140-28	18 A, 100 V, 230 mΩ max	LCC28	FP0011
IRF9140 types	SFF9140G	23 A, 100 V, 135 mΩ typ	Cerpack	FT0102
IRF9140 types	SFF9140J	18 A, 100 V, 230 mΩ max	T0-257	FP0015
IRF9140 types	SFF9140M	18 A, 100 V, 230 mΩ max	T0-254	FP0017
IRHNJ9130; IRF9140 types	SFF9140S.5	23 A, 100 V, 135 m Ω typ	SMD.5	FT0102
IRF9140 types	SFF9140Z	18 A, 100 V, 230 mΩ max	T0-254Z	FP0017
IRF9240 types	SFF9230M	6.5 A, 200 V, 500 mΩ typ	T0-254	FP0029
IRF9240 types	SFF9230Z	6.5 A, 200 V, 500 mΩ typ	T0-254Z	FP0029
IRF9240 types	SFF9240/3	9.3 A, 200 V, 350 mΩ typ	T0-3	FP0009
IRF9240 types	SFF9240-28	11 A, 200 V, 350 mΩ typ	LCC28	FP0007
IRF9240 types	SFF9240J	11 A, 200 V, 350 mΩ typ	T0-257	FP0001
IRF9240 types	SFF9240M	11 A, 200 V, 350 mΩ typ	T0-254	FP0003
IRF9240 types	SFF9240Z	11 A, 200 V, 350 mΩ typ	T0-254Z	FP0003
IRHLNJ797034	SFL22P06S.5**	22 A, 60 V, 78 mΩ typ, logic level	SMD.5	FT0088
IRHLUB7970Z4	SFL11P06S.22**	11 A, 60 V, 70 m Ω typ, logic level	SMD.22	FT0098
IRHN9150; IRF9150 types	SFF9150S1	45 A, 100 V, 47 mΩ typ	SMD1	FT0101
IRHNA597160; IRF9160 types	SFF75P10S2	75 A, 100 V, 30.5 mΩ typ	SMD2	FT0103
IRHNA597260	SFF65P20S2	65 A, 200 V, 80 mΩ typ	SMD2	FT0100
IRHNA5S97260	SFF65P20S2	65 A, 200 V, 80 mΩ typ	SMD2	FT0100
IRHNA9260	SFF65P20S2	65 A, 200 V, 80 mΩ typ	SMD2	FT0100
IRHNJ597130	SFF12P10S.22	12 A, 100 V, 145 mΩ typ	SMD.22	FT0113
IRHNJ597130	SFF25P10S.3	25 A, 100 V, 62 mΩ typ	SMD.3	FT0114
IRHNJ9130	SFF9130S.5	11 A, 100 V, 350 mΩ max	SMD.5	FP0025
IRHNJ9130	SFF9140S.5	23 A, 100 V, 135 mΩ typ	SMD.5	FT0102
IRHNJ9A7034	SFL40P06S.5**	40 A, 60 V, 30 mΩ typ, logic level	SMD.5	FT0099
JANS2N7422U	SFF9150S1	45 A, 100 V, 47 mΩ typ	SMD1	FT0101
JANS2N7426U2	SFF65P20S2	65 A, 200 V, 80 mΩ typ	SMD2	FT0100
JANS2N7545U3	SFF12P10S.22	12 A, 100 V, 145 mΩ typ	SMD.22	FT0113
JANS2N7545U3	SFF25P10S.3	25 A, 100 V, 62 mΩ typ	SMD.3	FT0114
JANS2N7549U2	SFF65P20S2	65 A, 200 V, 80 mΩ typ	SMD2	FT0100
JANSR2N7550U2	SFF75P10S2	75 A, 100 V, 30.5 mΩ typ	SMD2	FT0103
JANSR2N7624U3	SFL22P06S.5**	22 A, 60 V, 78 mΩ typ, logic level	SMD.5	FT0088
JANSR2N7626UB	SFL11P06S.22**	11 A, 60 V, 70 mΩ typ, logic level	SMD.22	FT0098
			,	

^{*}Wide variety of packages available - contact factory for additional options

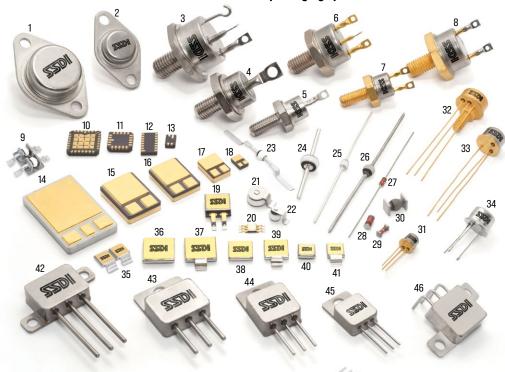
^{**}LET = 61.3 MeV up to rated voltage (planning to test further when additional beam time is available)

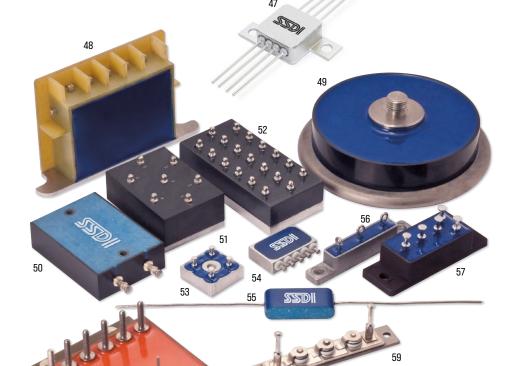
Examples of Hermetic Packaging



In-House Machine Shop / Packaging & Tooling Capabilities

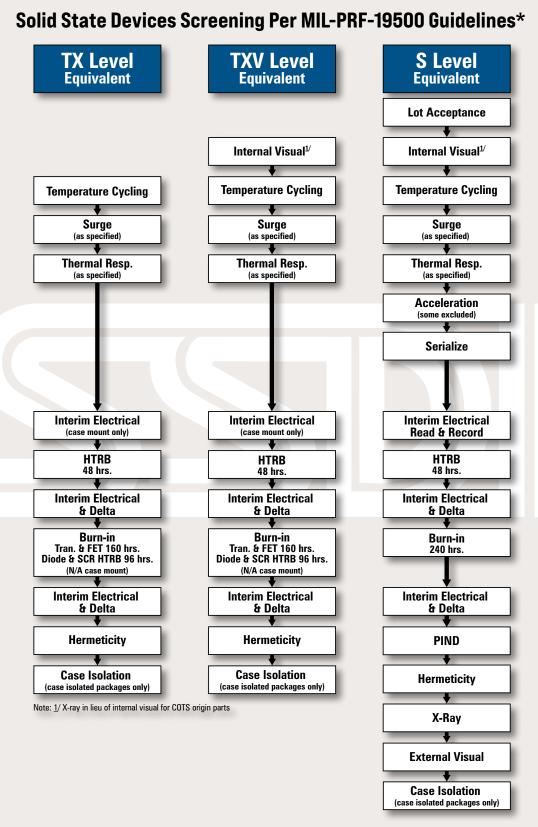
Contact SSDI to discuss modifications and additional packaging options





- 1. TO-3
- 2. TO-66
- 3. TO-63
- 4. DO-5 5. DO-4
- 6. TO-61 (3 terminals)
- 7. TO-59
- 8. T0-61 (2 terminals)
- 9. SPA648
- 10. LCC28
- 11. LCC20
- 12. LCC16
- 13. LCC4
- 14. Milpack 3
- 15. SMD2
- 16. SMD1
- 17. SMD.5
- 18. SMD.22
- 19. Cerpack
- 20. Gullwing
- 21. SRM Button Tab
- 22. SRL Button Tab
- 22. SRM Surface Mount Square Tab (SMS)
- 23. Flat Leads
- 24. SRM Axial
- 25. 1N7068 Axial
- 26. Frit Glass Axial
- 27. Glass Sleeve Axial
- 28. Glass Sleeve Surface Mount Round Tab (SM)
- 29. Glass Sleeve Surface Mount Square Tab
- 30. Frit Glass Surface Mount Square Tab (SMS)
- 31. TO-52
- 32. TO-82
- 33. TO-5
- 34. TO-39
- 35. Sedpack CT1 Front Mount
- 36. Sedpack 3
- 37. Sedpack 3 With Lead
- 38. Sedpack 2
- 39. Sedpack 2 With Lead
- 40. Sedpack 1
- 41. Sedpack 1 With Lead
- 42. T0-259
- 43. TO-258
- 44. T0-254
- 45. TO-257
- 46. TO-254Z
- 47. T0-254Z8
- 48. SDA475 HV Multiplier Rectifier Stack
- 49. SDAD103 Stackable HV Rectifier
- 50. STA60 HV Bidirectional TVS
- 51. SPA516 Dual Single Phase Bridge Assembly
- 52. SPX2091 HV Rectifier Bridge Stack
- 53. SDA267 Single Phase Bridge Rectifier Assembly
- 54. SDA669T Three Phase Bridge Rectifier Assembly
- 55. HV Stick
- 56. SDA380 Centertap Rectifier
- 57. SDA167 Three Phase Bridge Rectifier Assembly
- 58. SPMQ461 IGBT Power Module
- 59. SPMR494 Battery Charge Power Module
- 60. Battery Bypass Power Module



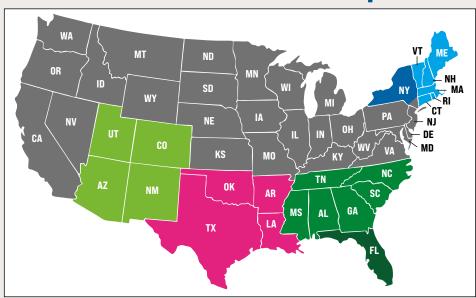


*Specific Product Types May Have Alternate Screening Flows

Contact your local SSDI Representative or contact the factory directly at (562) 404-4474.

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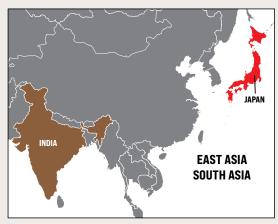
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