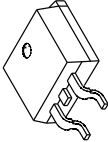


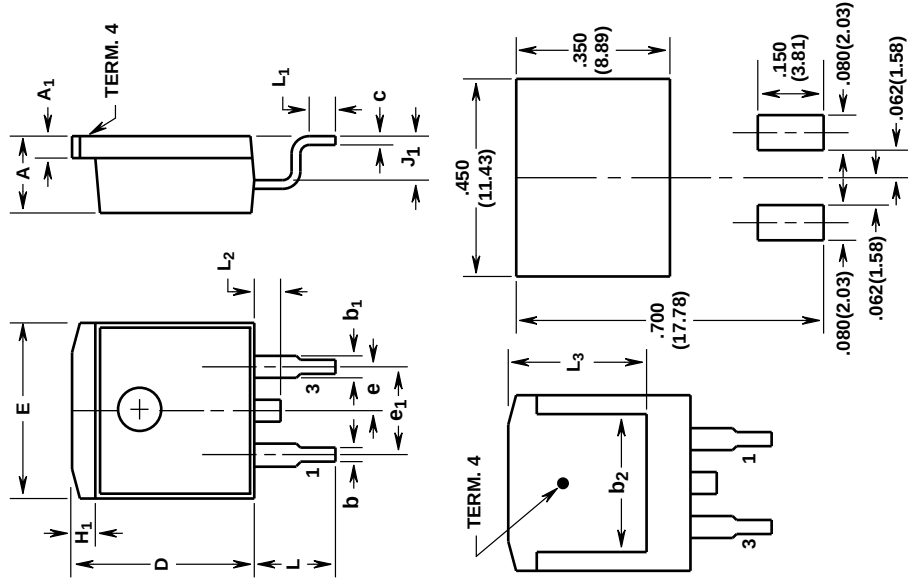
HARRIS POWER PRODUCT LINE



TO-263AB (D²-PAK)

RF1S Series Power MOSFET TO-263AB Product Matrix

BV _{DSS}	I _{DS(ON)}	0A TO 10A	11A TO 20A	21A TO 30A	31A TO 40A	41A TO 50A	51A TO 60A	61A TO 70A
30V	0.010Ω							RF1S70N03SM 30V, 70A, 0.010Ω
	0.022Ω					RF1S45N03LSM 30V, 45A, 0.022Ω		
	0.027Ω						RF1S60P03SM (Note) 30V, 60A, 0.027Ω	
	0.065Ω			RF1S30P05SM (Note) 50V, 30A, 0.065Ω				
50V	0.014Ω							RF1S70N06SM 60V, 70A, 0.014Ω
	0.022Ω					RF1S50N06SM 60V, 50A, 0.022Ω		
	0.028Ω					RF1S45N06SM 60V, 45A, 0.028Ω		
	0.047Ω			RF1S25N06SM 60V, 25A, 0.047Ω RF1S30N06LESM 60V, 30A, 0.047Ω		RF1S50N06LESM 60V, 50A, 0.022Ω RF1S45N06LESM 60V, 45A, 0.028Ω		
100V	0.065Ω			RF1S23N06LESM 60V, 23A, 0.065Ω RF1S30P06SM 60V, 30A, 0.065Ω				
	0.100Ω		RF1S17N06LSM 60V, 17A, 0.100Ω					
	0.140Ω		RF1S15N06SM 60V, 15A, 0.140Ω					
	0.040Ω				RF1S40N10SM 100V, 40A, 0.040Ω RF1S40N10LESM 100V, 40A, 0.040Ω			
200V	0.077Ω			RF1S540SM 100V, 28A, 0.077Ω				
	0.080Ω			RF1S22N10SM 100V, 22A, 0.080Ω				
	0.160Ω		RF1S530SM 100V, 14A, 0.160Ω					
	0.200Ω		RF1S9540SM (Note) 100V, 19A, 0.200Ω					
1000V	0.300Ω		RF1S9530SM (Note) 100V, 12A, 0.300Ω					
	0.18Ω		RF1S640SM 200V, 18A, 0.180Ω					
	0.400Ω	RF1S630SM 200V, 9A, 0.400Ω						
	0.500Ω		RF1S9640SM (Note) 200V, 11A, 0.500Ω					
1000V	0.800Ω	RF1S9630SM (Note) 200V, 6.5A, 0.800Ω						
	3.500Ω	RF1S4N100SM 1000V, 4.3A, 3.500Ω						
PART NOMENCLATURE DEVICE TYPE F: Standard MOSFET L: Current Limited MOSFET PACKAGE DESIGNATION 1S: TO-262, TO-263 CURRENT RATING 1 = 1A, 10 = 10A, 25 = 25A, etc. FEATURE SUFFIX L: Logic Level 5V Gate SM: Surface Mount Leadform (TO-263AB) E: ESD Protected Device 9A: Tape and Reel VOLTAGE RATING 05 = 50V, 10 = 100V, 20 = 200V, etc. POLARITY N: N-Channel P: P-Channel EXAMPLE: RF1S60P03SM Standard 60A, P-Channel, 30V, Surface Mount MOSFET								

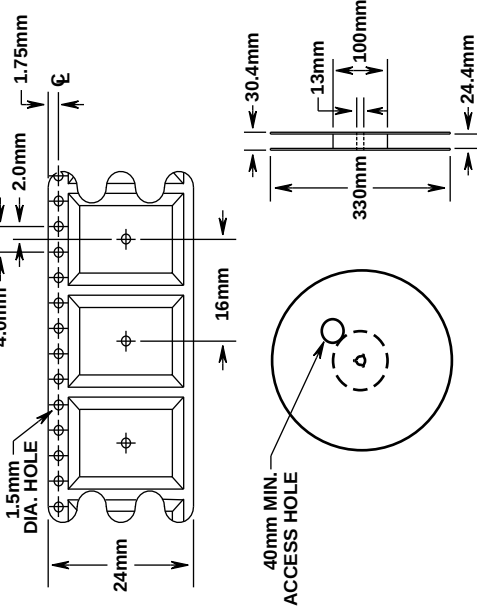


MINIMUM PAD SIZE RECOMMENDED FOR SURFACE-MOUNTED APPLICATIONS

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.170	0.180	4.32	4.57	-
A ₁	0.048	0.052	1.22	1.32	4, 5
b	0.030	0.034	0.77	0.86	4, 5
b ₁	0.045	0.055	1.15	1.39	4, 5
b ₂	0.310	-	7.88	-	2
c	0.018	0.022	0.46	0.55	4, 5
D	0.405	0.425	10.29	10.79	-
E	0.395	0.405	10.04	10.28	-
e	0.100 TYP		2.54 TYP		7
e ₁	0.200 BSC		5.08 BSC		7
H ₁	0.045	0.055	1.15	1.39	-
J ₁	0.095	0.105	2.42	2.66	-
L	0.175	0.195	4.45	4.95	-
L ₁	0.090	0.110	2.29	2.79	4, 6
L ₂	0.050	0.070	1.27	1.77	3
L ₃	0.315	-	8.01	-	2

NOTES:

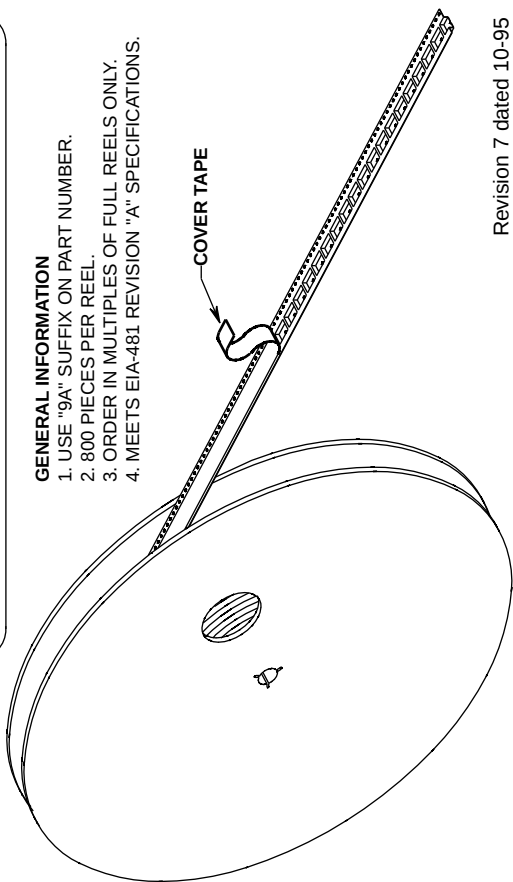
1. These dimensions are within allowable dimensions of Rev. C of JEDEC TO-263AB outline dated 2-92.
2. L₃ and b₂ dimensions established a minimum mounting surface for terminal 4.
3. Solder finish uncontrolled in this area.
4. Dimension (without solder).
5. Add typically 0.002 inches (0.05mm) for solder plating.
6. L₁ is the terminal length for soldering.
7. Position of lead to be measured 0.120 inches (3.05mm) from bottom of dimension D.
8. Controlling dimension: Inch.
9. Revision 7 dated 10-95.



USER DIRECTION OF FEED

GENERAL INFORMATION

1. USE "9A" SUFFIX ON PART NUMBER.
2. 800 PIECES PER REEL.
3. ORDER IN MULTIPLES OF FULL REELS ONLY.
4. MEETS EIA-481 REVISION "A" SPECIFICATIONS.



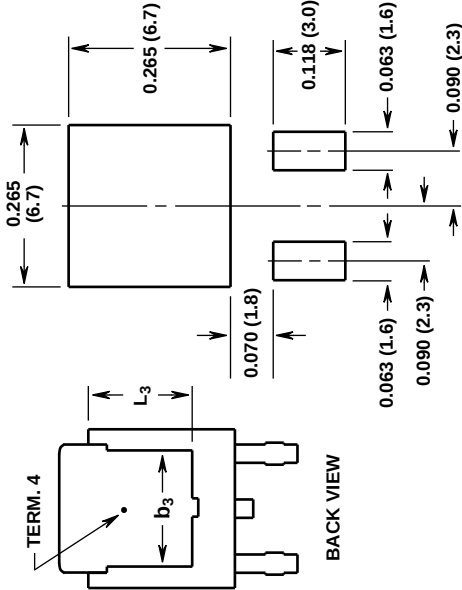
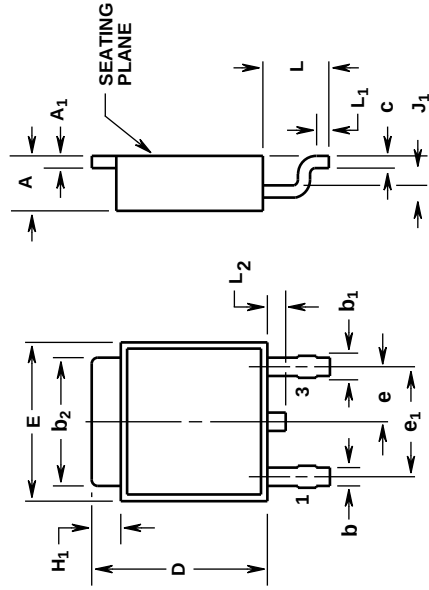
Revision 7 dated 10-95

TO-252AA (D-PAK)

[illegible]

		0A TO 3.5A		3.6A TO 7.9A		0A TO 3.5A			
BV _{DSS}	r _{DS(on)}			IRFR221 150V, 4.6A, 0.800Ω		IRFR320 400V, 3.1A 1.800Ω		0A TO 3.5A	
150V	0.800Ω			RFD7N10LESM 100V, 7A, 0.300Ω		400V, 2.6A 2.500Ω		IRFR322 400V, 2.6A 2.500Ω	
200V	0.300Ω			IRFR220 200V, 4.6A, 0.800Ω		450V		IRFR421 450V, 2.5A 3.000Ω	
	0.800Ω			IRFR222 200V, 3.8A 1.200Ω		500V		IRFR420 500V, 2.5A 3.000Ω	
	1.200Ω							IRFR422 500V, 2.2A 4.000Ω	
	1.500Ω	IRFR9220 (Note) 200V, 0.6A, 1.500Ω						IRFR410 500V, 1.5A 7.000Ω	
250V	2.000Ω	IRFR214 250V, 2.2A 2.000Ω							
350V	1.800Ω	IRFR321 350V, 3.1A 1.800Ω							

LC96586 2.1

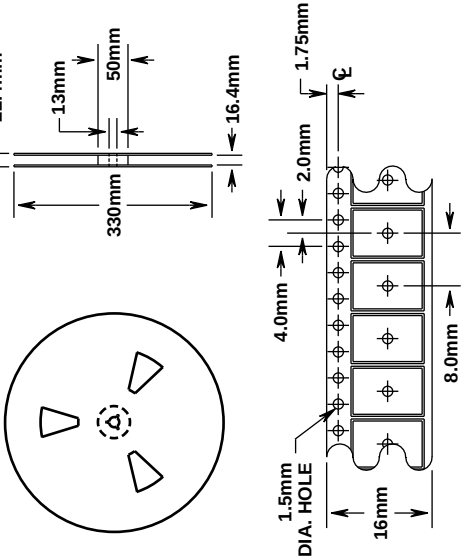


MINIMUM PAD SIZE RECOMMENDED FOR SURFACE-MOUNTED APPLICATIONS

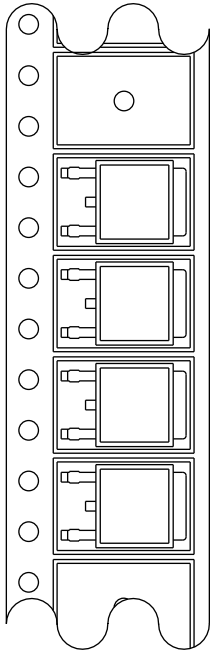
SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.086	0.094	2.19	2.38	-
A ₁	0.018	0.022	0.46	0.55	4, 5
b	0.028	0.032	0.72	0.81	4, 5
b ₁	0.033	0.040	0.84	1.01	4
b ₂	0.205	0.215	5.21	5.46	4, 5
b ₃	0.190	-	4.83	-	2
c	0.018	0.022	0.46	0.55	4, 5
D	0.270	0.290	6.86	7.36	-
E	0.250	0.265	6.35	6.73	-
e	0.090 TYP		2.28 TYP		7
e ₁	0.180 BSC		4.57 BSC		7
H ₁	0.035	0.045	0.89	1.14	-
J ₁	0.040	0.045	1.02	1.14	-
L	0.100	0.115	2.54	2.92	-
L ₁	0.020	-	0.51	-	4, 6
L ₂	0.025	0.040	0.64	1.01	3
L ₃	0.170	-	4.32	-	2

NOTES:

1. These dimensions are within allowable dimensions of Rev. B of JEDEC TO-252AA outline dated 9-88.
2. L₃ and b₃ dimensions establish a minimum mounting surface for terminal 4.
3. Solder finish uncontrolled in this area.
4. Dimension (without solder).
5. Add typically 0.002 inches (0.05mm) for solder plating.
6. L₁ is the terminal length for soldering.
7. Position of lead to be measured 0.090 inches (2.28mm) from bottom of dimension D.
8. Controlling dimension: Inch.
9. Revision 5 dated 10-95.

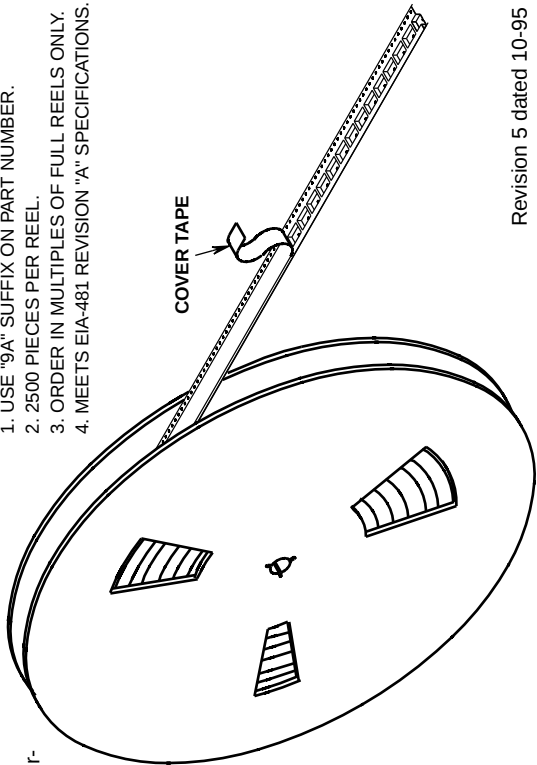


USER DIRECTION OF FEED



GENERAL INFORMATION

1. USE "9A" SUFFIX ON PART NUMBER.
2. 2500 PIECES PER REEL.
3. ORDER IN MULTIPLES OF FULL REELS ONLY.
4. MEETS EIA-481 REVISION "A" SPECIFICATIONS.



Revision 5 dated 10-95

HARRIS POWER PRODUCT LINE



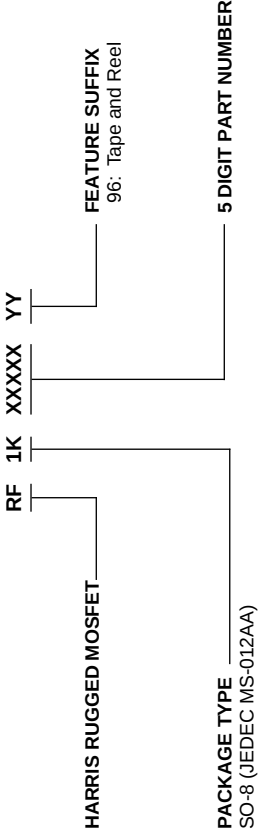
RF1K Series Power MOSFET SO-8 Product Matrix

BV _{DSS}	r _{DS(ON)}	2A	2.5A	3.5A	6.3A	7A
12V	0.050			RF1K49090 (Note 1) 12V, 3.5A, 0.050Ω		
	0.020					RF1K49211 (Note 2) 12V, 7A, 0.020Ω
	0.130		RF1K49092 (Note 1) 12V, 2.5A, 0.130Ω (P) 12V, 3.5A, 0.050Ω (N)	RF1K49093 (Note 1) 12V, 3.5A, 0.130Ω		
30V	0.030				RF1K49156 (Note 2) 30V, 6.3A, 0.030Ω	
	0.060			RF1K49157 (Note 2) 30V, 6.3A, 0.030Ω		
60V	0.150	RF1K49154 (Note 1) 60V, 2A, 0.150Ω		RF1K49086 (Note 1) 30V, 3.5A, 0.060Ω RF1K49088 (Note 1) 30V, 3.5A, 0.060Ω		

NOTES:

- 1. Dual Function MOSFET,
- 2. Single Function MOSFET

PART NOMENCLATURE



EXAMPLE: **RF1K49092**
Avalanche Rated, N-Channel, Logic Level,
Complementary Enhancement Mode MOSFET
12V, 3.5A, 0.050Ω r_{DS(ON)}

Features

- Low voltage inputs eliminate the need for charge pumps in high side load switching applications
- Low r_{DS(ON)} reduces power consumption and increases efficiency
- Low profile package, excellent for height restricted applications
- Dual functions per package increase board packing density and reduces part count
- Surface mount, small footprint, aids high volume assembly
- Designed, tested, and rated for ruggedness
- Low voltage logic level input characteristics
- The most comprehensive data sheet characterization of any supplier
 - Temperature compensated SPICE models
 - Single pulse UIS curves
 - Switching vs gate resistance
 - r_{DS(ON)} vs V_{GS} curves

Applications

Telecom/Communications

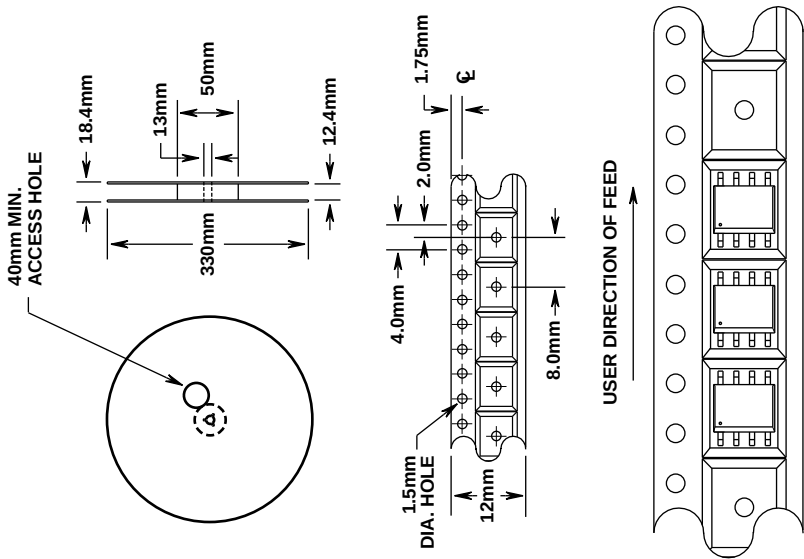
- DC/DC converters
- Synchronous buck regulator circuits
- Ultra efficient synchronous boost regulators for 5V-20V systems
- Cellular telephones/Wireless products
- Battery charging circuits
- Power management circuits

Computer/EDP

- Load management and power control
- Laptop computer PCMCIA cards, Fax/Modems and display back lighting
- 5V and 3.3V low power applications
- Low voltage DC/DC converters
- Motor Control
- Tape drives, disk drives, and low voltage motors

MS-012AA 8 LEAD JEDEC MS-012AA SMALL OUTLINE PLASTIC PACKAGE

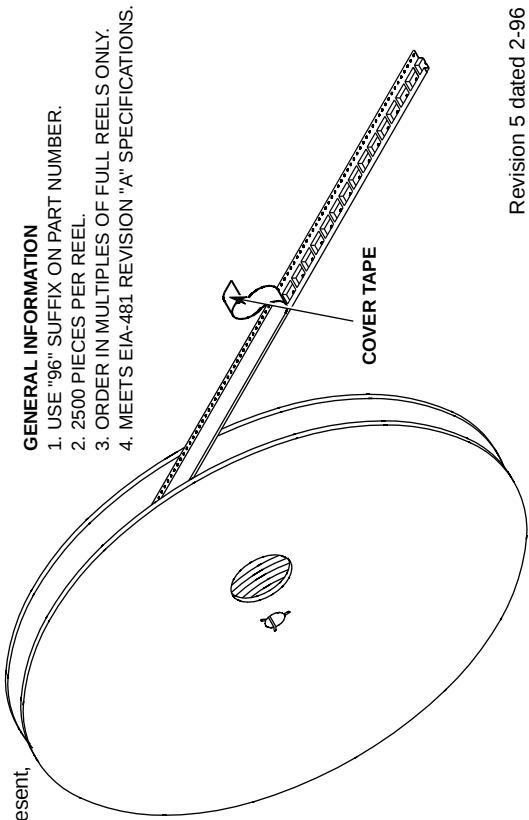
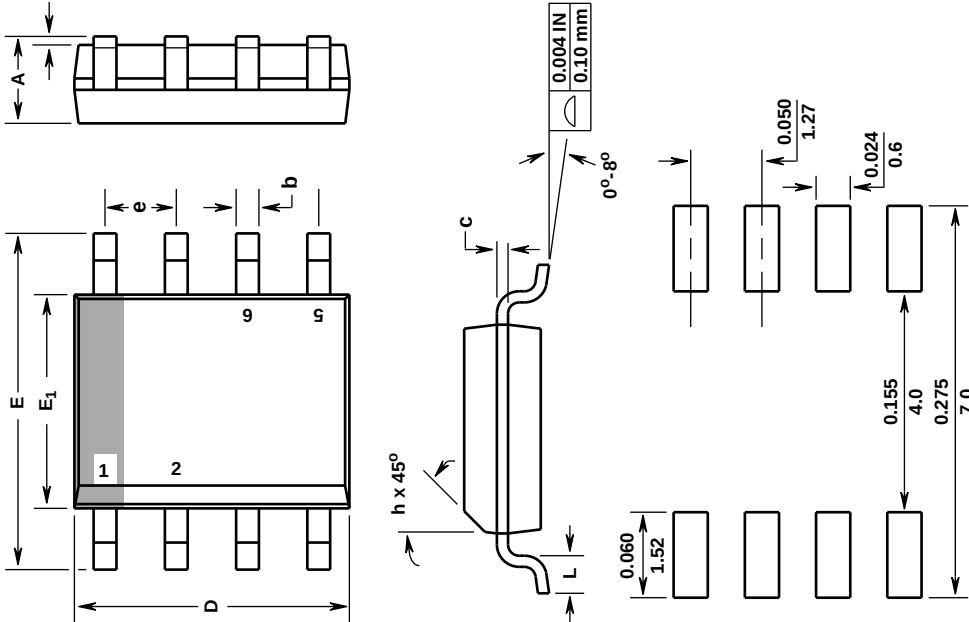
12mm TAPE AND REEL



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.0532	0.0688	1.35	1.75	-
A ₁	0.004	0.0098	0.10	0.25	-
b	0.013	0.020	0.33	0.51	-
c	0.0075	0.0098	0.19	0.25	-
D	0.189	0.1968	4.80	5.00	2
E	0.2284	0.244	5.80	6.20	-
E ₁	0.1497	0.1574	3.80	4.00	3
e	0.050 BSC		1.27 BSC		-
H	0.0099	0.0196	0.25	0.50	-
L	0.016	0.050	0.40	1.27	4

NOTES:

1. All dimensions are within allowable dimensions of Rev. C of JEDEC MS-012AA outline dated 5-90.
2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.006 inches (0.15mm) per side.
3. Dimension "E₁" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 0.010 inches (0.25mm) per side.
4. "L" is the length of terminal for soldering.
5. The chamfer on the body is optional. If it is not present, a visual index feature must be located within the crosshatched area.
6. Controlling dimension: Millimeter.
7. Revision 5 dated 2-23-96.



GENERAL INFORMATION

1. USE "96" SUFFIX ON PART NUMBER.
2. 2500 PIECES PER REEL.
3. ORDER IN MULTIPLES OF FULL REELS ONLY.
4. MEETS EIA-481 REVISION "A" SPECIFICATIONS.

Revision 5 dated 2-96

HARRIS DISCRETE POWER PRODUCT LINE

TO-251/252 10V GATES STANDARD DEVICE

V _{DSS} (V)	r _{DSON}	I (A)	TO-251AA	TO-252AA	CHANNEL
50V	0.047Ω	16A	RFD16N05	RFD16N05SM	N
	0.100Ω	14A	RFD14N05	RFD14N05SM	N
	0.150Ω	15A	RFD15P05	RFD15P05SM	P
50V	0.300Ω	8A	RFD8P05	RFD8P05SM	P
	0.047Ω	16A	RFD16N06	RFD16N06SM	N
60V	0.100Ω	14A	RFD14N06	RFD14N06SM	N
	0.150Ω	15A	RFD15P06	RFD15P06SM	P
	0.300Ω	8A	RFD8P06E	RFD8P06ESM	P
	0.150Ω	12A	RFD3055	RFD3055SM	N
80V	0.270Ω	8.4A	IRFU121	IRFR121	N
100V	0.270Ω	8.4A	IRFU120	IRFR120	N
	0.540Ω	4.7A	IRFU110	IRFR110	N
	0.600Ω	5.6A	IRFU9120	IRFR9120	P
	1.200Ω	3.1A	IRFU9110	IRFR9110	P
	0.800Ω	4.6A	IRFU221	IRFR221	N
150V	0.800Ω	4.6A	IRFU220	IRFR220	N
200V	1.200Ω	3.8A	IRFU222	IRFR222	N
	1.500Ω	0.6A	IRFU9220	IRFR9220	P
	2.000Ω	2.2A	IRFU214	IRFR214	N
250V	1.800Ω	3.1A	IRFU321	IRFR321	N
350V	1.800Ω	3.1A	IRFU320	IRFR320	N
	2.500Ω	2.6A	IRFU322	IRFR322	N
450V	3.000Ω	2.5A	IRFU421	IRFR421	N
500V	3.000Ω	2.5A	IRFU420	IRFR420	N
	4.000Ω	2.2A	IRFR422	IRFR422	N
	7.000Ω	1.5A	IRFU410	IRFR410	N

TO-251/252 LOGIC LEVEL DEVICES

V _{DSS} (V)	r _{DSON}	I (A)	TO-251AA	TO-252AA	CHANNEL
30V	0.022Ω	16A	RFD16N03L	RFD16N03LSM	N
	0.200Ω	10A	RFD10P03L	RFD10P03LSM	P
	0.047Ω	16A	RFD16N05L	RFD16N05LSM	N
50V	0.100Ω	14A	RFD14N05L	RFD14N05LSM	N
	0.047Ω	16A	RFD16N06LE	RFD16N06LES	N
	0.065Ω	15A	RFD15N06LE	RFD15N06LES	N
60V	0.100Ω	14A	RFD14N06L	RFD14N06LSM	N
	0.135Ω	12A	RFD12N06RLE	RFD12N06RLES	N
	0.150Ω	12A	RFD3055LE	RFD3055LES	N
	0.600Ω	4A	RFD4N06L	RFD4N06LSM	N
	0.800Ω	3A	RFD3N08L	RFD3N08LSM	N
100V	0.300Ω	7A	RFD7N10LE	RFD7N10LES	N

TO-262/263 10V GATES STANDARD DEVICE

V _{DSS} (V)	r _{DSON}	I (A)	TO-262AA	TO-263AB	CHANNEL
30V	0.010Ω	70A	RF1S70N03	RF1S70N03SM	N
	0.027Ω	60A	RF1S60P03	RF1S60P03SM	P
	0.065Ω	30A	RF1S30P05	RF1S30P05SM	P
50V	0.014Ω	70A	RF1S70N06	RF1S70N06SM	N
60V	0.022Ω	50A	RF1S50N06	RF1S50N06SM	N
	0.028Ω	45A	RF1S45N06	RF1S45N06SM	N
	0.047Ω	25A	RF1S25N06	RF1S25N06SM	N
	0.075Ω	30A	RF1S30P06	RF1S30P06SM	P
	0.140Ω	15A	RF1S15N06	RF1S15N06SM	N
	0.080Ω	22A	RF1S22N10	RF1S22N10SM	N
	0.160Ω	14A	RF1S530	RF1S530SM	N
100V	0.200Ω	19A	RF1S9540	RF1S9540SM	P
	0.300Ω	12A	RF1S9530	RF1S9530SM	P
	0.040Ω	40A	RF1S40N10	RF1S40N10SM	N
	0.077Ω	28A	RF1S540	RF1S540SM	N
	0.180Ω	18A	RF1S640	RF1S640SM	N
	0.400Ω	9A	RF1S630	RF1S630SM	N
	0.500Ω	11A	RF1S9640	RF1S9640SM	P
200V	0.800Ω	6.5A	RF1S9630	RF1S9630SM	P
	3.500Ω	4.3A	RF1S4N100	RF1S4N100SM	N
1000V					

TO-262/263 LOGIC LEVEL DEVICES

V _{DSS} (V)	r _{DSON}	I (A)	TO-262AA	TO-263AB	CHANNEL
30V	0.022Ω	45A	RF1S45N03L	RF1S45N03LSM	N
60V	0.022Ω	50A	RF1S50N06LE	RF1S50N06LES	N
	0.028Ω	45A	RF1S45N06LE	RF1S45N06LES	N
	0.047Ω	30A	RF1S30N06LE	RF1S30N06LES	N
	0.065Ω	23A	RF1S23N06LE	RF1S23N06LES	N
	0.100Ω	17A	RF1S17N06L	RF1S17N06LSM	N

SO-8 10V GATES STANDARD DEVICE LITTLE FET DEVICES

V _{DSS} (V)	r _{DSON}	I (A)	DEVICE	PACKAGE	CHANNEL
30V	0.030Ω	6.3A	RF1K49157	SO-8	N
	0.060Ω	3.5A	RF1K49086	SO-8	N

SO-8 LOGIC LEVEL DEVICES LITTLE FET DEVICES

V _{DSS} (V)	r _{DSON}	I (A)	DEVICE	PACKAGE	CHANNEL
12V	0.020Ω	7A	RF1K49211	SO-8	N
	0.050Ω	3.5A	RF1K49092	SO-8	N
			RF1K49090	SO-8	N
	0.130Ω	2.5A	RF1K49092	SO-8	P
30V		3.5A	RF1K49093	SO-8	P
	0.030Ω	6.3A	RF1K49156	SO-8	N
	0.060Ω	3.5A	RF1K49088	SO-8	N
	0.150Ω	2.0A	RF1K49154	SO-8	N

Parts can be shipped in tape and reel form by placing 9A at the end of the part number.
EXAMPLE: RFD16N03L-SM9A - Same as RFD16N05LSM but Tape & Reeled.

ITALICS = Future Offerings (2nd Quarter FY '97)

LC96586_ 4.1

HARRIS DISCRETE POWER PRODUCT LINE - Plastic Packages

P-CHANNEL DEVICES

V _{DSS} (V)	r _{DS(on)}	I (A)	DEVICE	PACKAGE	CHANNEL
12V	0.050Ω	2.5A	RF1K49092	SO-8	P
	0.130Ω	3.5A	RF1K49093	SO-8	P
	0.027Ω	60A	RF1S60P03/SM	TO-262AA/263AB	P
30V	0.065Ω	30A	RF1S30P05SM	TO-262AA/263AB	P
	0.200Ω	10A	RFD10P03L/SM	TO-251AA/252AA	P
	0.300Ω	8A	RFD8P05/SM	TO-251AA/252AA	P
	0.150Ω	15A	RFD15P05/SM	TO-251AA/252AA	P
	0.075Ω	30A	RF1S30P06/SM	TO-262AA/263AB	P
60V	0.150Ω	15A	RFD15P06/SM	TO-251AA/252AA	P
	0.300Ω	8A	RFD8P06E/SM	TO-251AA/252AA	P
	0.200Ω	19A	RF1S9540/SM	TO-262AA/263AB	P
	0.300Ω	12A	RF1S9530/SM	TO-262AA/263AB	P
	0.600Ω	5.6A	IRFR9120	TO-252AA	P
100V	1.200Ω	3.1A	IRFU9120	TO-251AA	P
			IRFR9110	TO-252AA	P
			IRFU9110	TO-251AA	P
	0.500Ω	11A	RF1S9640/SM	TO-262AA/263AB	P
	0.800Ω	6.5A	RF1S9630/SM	TO-262AA/263AB	P
200V	1.500Ω	0.6A	IRFR9220	TO-252AA	P
			IRFU9220	TO-251AA	P

Advanced Power MOS

Features

- Current limiting, voltage clamping
- Over voltage gate protection
- Thermal protection
- Logic level

Applications

- Fault tolerant motor drives
- Stall protection
- Current inrush limiting
- Automotive headlamp drivers
- Diagnostic motor controls

Logic Level MOSFETs

Features

- Full drain current rating with 5V gate drive
- Microprocessor and logic compatible
- Electrostatic discharge protected gates available
- Avalanche energy capability available
- Both N and P channel devices
- BV_{DSS} rating of 50V to 200V

- Surface mount TO-251/2 (D-PAK), MS-012 (SO-8), TO-262/3 (D²-PAK)

Applications

- Solid state DC relays
- Lamp drivers
- Stepper motor drives
- Small motor controls
- High side drivers
- SMPS MOSFET predrivers

JEDEC MOSFETs

Features

- JEDEC Registered MOSFETs for Military and High Rel Applications
- BV_{DSS} 60V to 500V
- N and P channel devices
- Hermetic packages

Applications

- Military
- High Reliability
- Space

Standard RFx and IRFx MOSFETs
N and P Channel

Features

- Size 1 through 5 die
- All IRF types are avalanche capable
- BV_{DSS} up to 1000V

Applications

- Offline and DC/DC converters
- Power supplies
- Pulse generators
- Super efficient DC/DC converters
- Solid state DC relays
- Low loss DC switches
- Lamp drivers
- Operational amplifier buffer stage
- Stepper motor drives
- Small motor controls
- Laser diode pulse generators
- SMPS drivers

PLASTIC PACKAGES

