

## Features

- Ultra small package: 1.6x1.0x0.5mm
- 3000Watts peak pulse power (tp = 8/20µs)
- Bidirectional configurations
- Solid-state silicon-avalanche technology
- Low clamping voltage
- 2-pin leadless package
- RoHS compliant



## IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (air),  $\pm 30\text{kV}$  (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning ) 140A (8/20 µs)

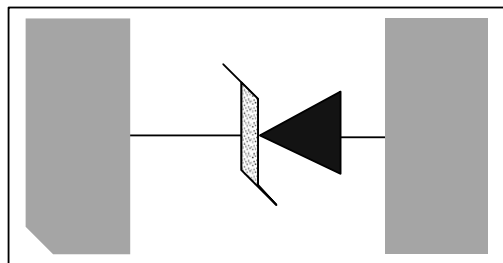
## Mechanical Characteristics

- Package: DFN1610-2L
- Molding compound flammability rating: UL 94V-0
- Marking: Marking Code
- Packaging: Tape and Reel
- RoHS/WEEE Compliant
- MSD Level: 2

## Applications

- Cellular Handsets and Accessories
- Microprocessor based equipment
- Personal Digital Assistants (PDA's)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Peripherals
- Keypads, Side Keys, LCD Displays
- Audio Players

## Schematic and PIN Configuration

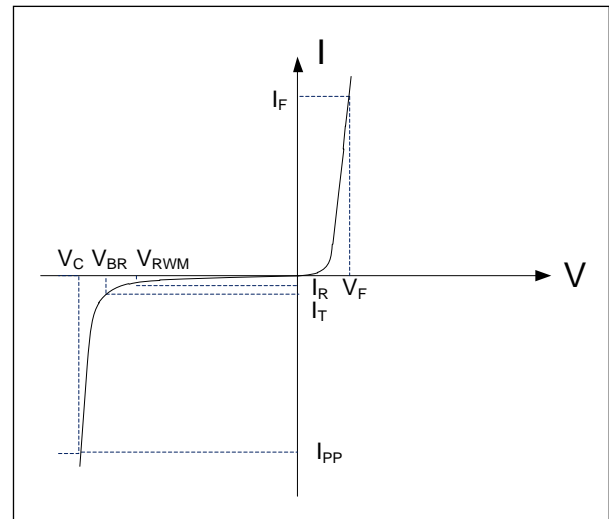


## Absolute Maximum Ratings (TA=25°C unless otherwise specified)

Rating	Symbol	Value	Units
Peak Pulse Power ( $t_p = 8/20\mu s$ )	$P_{PP}$	3000	Watts
Peak Pulse Current ( $t_p = 8/20\mu s$ )(note1)	$I_{PP}$	140	A
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$V_{ESD}$	30 30	kV
Lead Soldering Temperature	$T_L$	260(10seconds)	°C
Junction Temperature	$T_J$	-55 to + 125	°C
Storage Temperature	$T_{stg}$	-55 to + 125	°C

## Portion Electronics Parameter

Symbol	Parameter
$I_T$	Test Current
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_C$



## Electrical Characteristics (TA=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typical	Max	Units
Reverse Stand-Off Voltage	$V_{RWM}$				7.0	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T = 1mA$	7.2			V
Reverse Leakage Current	$I_R$	$V_{RWM} = 7.0V, T = 25^\circ C$		0.1	0.5	$\mu A$
Peak Pulse Current	$I_{PP}$	$t_p = 8/20\mu s$			140	A
Clamping Voltage	$V_C$	$I_{PP} = 140A, t_p = 8/20\mu s$		22		V
Junction Capacitance	$C_j$	$V_R = 0V, f = 1MHz$		1100		pF

## Typical Characteristics (TA=25°C unless otherwise Specified)

Figure 1: Peak Pulse Power vs. Pulse Time

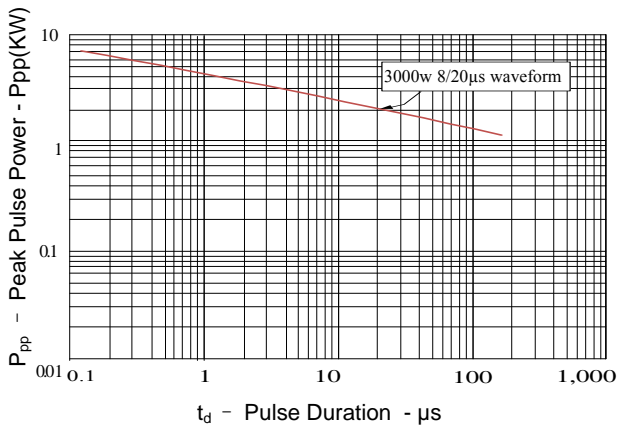


Figure 2: Power Derating Curve

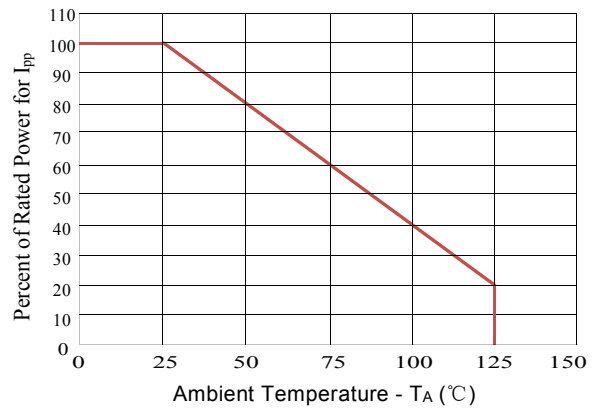


Figure 3: Pulse Waveform

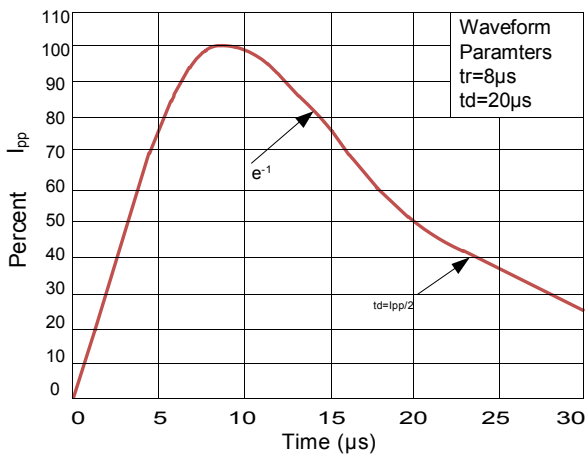
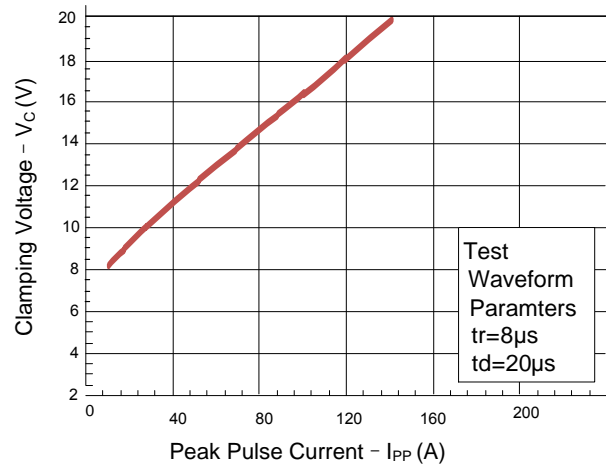
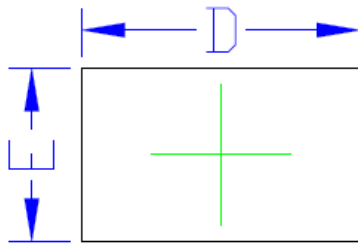


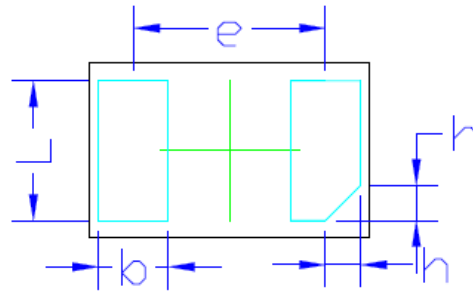
Figure 4: Clamping Voltage vs. Ipp



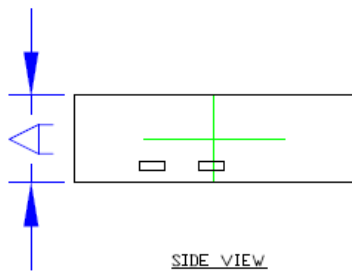
## DFN1610-2 Package Outline Drawing



TOP VIEW



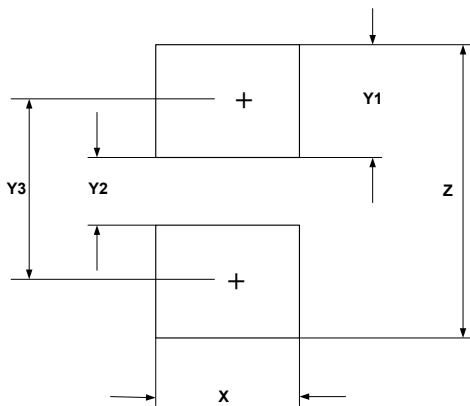
BOTTOM VIEW



SIDE VIEW

COMMON DIMENSION (MM)			
PKG	DFN1610		
REF.	MIN.	NOM.	MAX
A	0.45	0.50	0.55
D	1.55	1.60	1.65
E	0.95	1.00	1.05
b	0.35	0.40	0.45
L	0.75	0.80	0.85
e	110BSC		
h	0.15	0.20	0.25

## Suggested Land Pattern

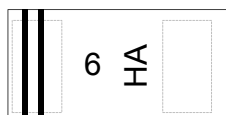


SYM	DIMENSIONS	
	MILLIMETERS	INCHES
X	0.60	0.024
Y1	0.50	0.020
Y2	0.30	0.012
Y3	0.80	0.032
Z	1.30	0.052


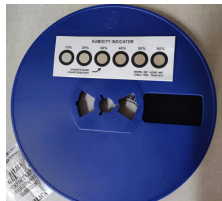



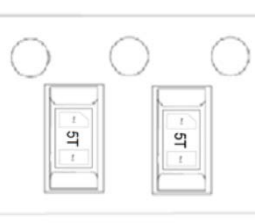

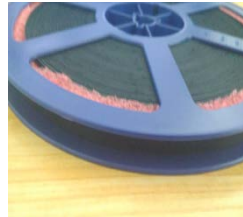




## Order Information

Order code	Package	Packaging	Delivery mode
MDFN1610A071S	DFN1610-2	3000/Tape & Reel	Tape and reel

## Marking



## DFN1610 成品包装规范

适用封装:		DFN1610		文件编号:		MDFN1610A071S		版本: 00		
包装材料	名称	载带及盖带		卷盘		静电袋		标签		
	规格			蓝色 7 寸卷盘		铝箔静电袋				
	描述	8mm 载带		六轮卷盘				80mm*50mm		
	图片									
		A面		B面						
包装过程	载带中产品印字方向	载带绕盘方向		卷盘上是否贴标		每整盘数量		每整盒数量		每整箱数量
	PIN1 脚朝向载带定位孔 (印字为示例)	载带定位孔朝向卷盘 B 面 (下图背面)		否, 卷盘免标		10k/盘		10 盘/盒 100k/盒		4 盒/箱 400k/箱
										
标签			Part NO: 订单型号	修改内容	版本	拟制	修改内容		批准	日期
			Package: 封装形式		00	王康	原始文件		李炘	2019. 01. 08
			Quantity: 包装数目							
			Lot No: 订单批号							
		Marking: 成品印字								
客户:				客户代表:				日期:		

**Reliability Test Summary**

Order	Test Item	Abrv	Equipment	Condition		Duration	Reference	Testing Equ.	Fa <sub>il</sub> /S.S	Pass/Rej
				Vol.(V)	Temp.(°C)					
1	High Temperature Reverse Bias Test	HTRB	SY001	Vol.(V)	Temp.(°C)	168H	JESD22 A-108	TVR6000	0 / 22	PASS
				6.8	150					
2	Temperature Humidity Test	TH	SY014	Ta= 85°C, 85%R.H.		168H	JESD22 A-101	TVR6000	0 / 22	PASS
3	Temperature Cycling Test	TC	SY011	-55°C / +150°C / 30min.		10Cycles	JESD22 A-104	TVR6000	0 / 22	PASS
4	solder resistance	S/R	Solder 1	temperature of solder POT=260±5°C		10S	GB/T2423-2007-28	TVR6000	0 / 22	PASS
5	solder ability	S.A.T	Solder 2	POT=245±5 °C,2±0.5sec. dipping depth =0.5inch		-	GB/T2423-2007-28	TVR6000	0 / 22	PASS
6	High Temperature Storage Life Test	HT	HX044	Ta=+155°C		96H	MIL-STD-750-1035	TVR6000	0 / 22	PASS
7	Pressure Cooking Test	PCT	SY012	Ta=121°C Rh=100% 2atm		96H	JESD22-A102	TVR6001	0 / 22	PASS

**Reliability Electrical Summary**

Parameter	Condition		Spec LSL	Spec USL	NOTE
VBR(V)	IT(mA)	1	7	-	5% of spec reading of each test after completion testing.
IR(nA)	VR(V)	6.8	-	1000	within 2 times of spec reading of each test after completion testing.

## Temperature Humidity Test

### Electrical Data

**Request Part Number:** MDFN1610A071S

**Purpose:** Reliability Plan

Read points	initial		168H		Δ%(VBR) within spec	Times(IR) within spec
	VBR1	IR1	VBR1	IR1		
Unit	V	nA	V	nA	-	-
Condition	IT(mA)	VR(V)	IT(mA)	VR(V)	-	-
	1	6.8	1	6.8	-	-
<b>Spec LSL</b>	<b>7</b>	<b>-</b>	<b>7</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Spec USL</b>	<b>-</b>	<b>1000</b>	<b>-</b>	<b>1000</b>	<b>5%</b>	<b>2</b>
Min	7.20	5.62	7.10	5.06	-2.5%	0.005
Max	7.29	54.75	7.29	54.86	1.1%	0.055
Avg	7.25	27.28	7.21	32.15	-0.6%	0.032
Sigma	0.03	13.30	0.05	16.34	0.8%	0.016
1	7.24	12.53	7.19	21.73	-0.7%	0.022
2	7.23	20.82	7.21	46.38	-0.3%	0.046
3	7.27	19.16	7.25	7.99	-0.3%	0.008
4	7.22	37.73	7.19	37.21	-0.4%	0.037
5	7.26	11.88	7.17	20.06	-1.2%	0.020
6	7.21	37.41	7.22	5.06	0.1%	0.005
7	7.21	20.76	7.29	6.05	1.1%	0.006
8	7.21	5.62	7.24	37.56	0.4%	0.038
9	7.26	41.83	7.22	52.98	-0.6%	0.053
10	7.27	34.83	7.28	54.86	0.1%	0.055
11	7.27	11.72	7.14	8.21	-1.8%	0.008
12	7.29	35.72	7.22	53.52	-1.0%	0.054
13	7.26	11.72	7.14	44.96	-1.7%	0.045
14	7.24	24.92	7.20	31.92	-0.6%	0.032
15	7.29	24.47	7.11	23.56	-2.5%	0.024
16	7.20	35.55	7.10	37.91	-1.4%	0.038
17	7.25	34.43	7.22	17.66	-0.4%	0.018
18	7.29	54.75	7.29	44.00	0.0%	0.044
19	7.25	24.51	7.21	27.68	-0.6%	0.028
20	7.28	20.96	7.19	51.52	-1.2%	0.052
21	7.26	53.15	7.15	41.71	-1.5%	0.042
22	7.25	25.79	7.28	34.79	0.4%	0.035
Fail Q'ty	<b>0</b>					
RESULT:	<b>PASS</b>					

## Temperature Humidity Test

### Electrical Data

**Request Part Number:** MDFN1610A071S

**Purpose:** Reliability Plan

Read points	initial		168H		Δ%(VBR) within spec	Times(IR) within spec
	VBR1	IR1	VBR1	IR1		
Test	V	nA	V	nA	-	-
Unit	V	nA	V	nA	-	-
Condition	IT(mA)	VR(V)	IT(mA)	VR(V)	-	-
	1	6.8	1	6.8	-	-
<b>Spec LSL</b>	<b>7</b>	<b>-</b>	<b>7</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Spec USL</b>	<b>-</b>	<b>1000</b>	<b>-</b>	<b>1000</b>	<b>5%</b>	<b>2</b>
Min	7.20	5.62	7.10	5.06	-2.5%	0.005
Max	7.29	54.75	7.29	54.86	1.1%	0.055
Avg	7.25	27.28	7.21	32.15	-0.6%	0.032
Sigma	0.03	13.30	0.05	16.34	0.8%	0.016
1	7.24	12.53	7.19	21.73	-0.7%	0.022
2	7.23	20.82	7.21	46.38	-0.3%	0.046
3	7.27	19.16	7.25	7.99	-0.3%	0.008
4	7.22	37.73	7.19	37.21	-0.4%	0.037
5	7.26	11.88	7.17	20.06	-1.2%	0.020
6	7.21	37.41	7.22	5.06	0.1%	0.005
7	7.21	20.76	7.29	6.05	1.1%	0.006
8	7.21	5.62	7.24	37.56	0.4%	0.038
9	7.26	41.83	7.22	52.98	-0.6%	0.053
10	7.27	34.83	7.28	54.86	0.1%	0.055
11	7.27	11.72	7.14	8.21	-1.8%	0.008
12	7.29	35.72	7.22	53.52	-1.0%	0.054
13	7.26	11.72	7.14	44.96	-1.7%	0.045
14	7.24	24.92	7.20	31.92	-0.6%	0.032
15	7.29	24.47	7.11	23.56	-2.5%	0.024
16	7.20	35.55	7.10	37.91	-1.4%	0.038
17	7.25	34.43	7.22	17.66	-0.4%	0.018
18	7.29	54.75	7.29	44.00	0.0%	0.044
19	7.25	24.51	7.21	27.68	-0.6%	0.028
20	7.28	20.96	7.19	51.52	-1.2%	0.052
21	7.26	53.15	7.15	41.71	-1.5%	0.042
22	7.25	25.79	7.28	34.79	0.4%	0.035
<b>Fail Q'ty</b>	<b>0</b>					
<b>RESULT:</b>	<b>PASS</b>					



## Temperature Cycling Test

### Electrical Data

**Request Part Number:** MDFN1610A071S

**Purpose:** Reliability Plan

Read points	initial		10Cycles		Δ%(VBR) within spec	Times(IR) within spec
	VBR1	IR1	VBR1	IR1		
Unit	V	nA	V	nA	-	-
Condition	IT(mA)	VR(V)	IT(mA)	VR(V)	-	-
	1	6.8	1	6.8	-	-
<b>Spec LSL</b>	<b>7</b>	<b>-</b>	<b>7</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Spec USL</b>	<b>-</b>	<b>1000</b>	<b>-</b>	<b>1000</b>	<b>5%</b>	<b>2</b>
Min	7.20	5.81	7.10	6.00	-2.1%	0.006
Max	7.29	43.96	7.29	53.00	1.1%	0.053
Avg	7.23	22.70	7.21	30.65	-0.4%	0.031
Sigma	0.03	12.37	0.06	13.09	1.0%	0.013
1	7.23	22.40	7.17	35.69	-0.8%	0.036
2	7.22	27.17	7.28	37.70	0.8%	0.038
3	7.23	30.85	7.17	47.69	-0.8%	0.048
4	7.25	34.39	7.25	14.81	0.0%	0.015
5	7.22	27.91	7.19	9.63	-0.4%	0.010
6	7.20	32.08	7.27	31.36	1.0%	0.031
7	7.27	36.53	7.19	19.65	-1.1%	0.020
8	7.27	43.96	7.25	39.93	-0.3%	0.040
9	7.24	11.10	7.27	14.22	0.4%	0.014
10	7.24	36.47	7.10	51.29	-1.9%	0.051
11	7.25	6.98	7.14	38.72	-1.5%	0.039
12	7.20	7.44	7.18	42.52	-0.3%	0.043
13	7.21	22.64	7.29	27.05	1.1%	0.027
14	7.24	21.23	7.15	28.92	-1.2%	0.029
15	7.22	9.69	7.23	29.57	0.1%	0.030
16	7.25	11.75	7.27	20.80	0.3%	0.021
17	7.22	15.55	7.27	53.00	0.7%	0.053
18	7.29	7.37	7.21	25.39	-1.1%	0.025
19	7.20	12.79	7.16	27.94	-0.6%	0.028
20	7.20	34.56	7.28	6.00	1.1%	0.006
21	7.25	40.82	7.11	43.75	-1.9%	0.044
22	7.25	5.81	7.10	28.70	-2.1%	0.029
<b>Fail Q'ty</b>	<b>0</b>					
<b>RESULT:</b>	<b>PASS</b>					

## solder resistance

### Electrical Data

**Request Part Number:** MDFN1610A071S

**Purpose:** Reliability Plan

Read points	initial		10S		Δ%(VBR) within spec	Times(IR) within spec
	VBR1	IR1	VBR1	IR1		
Unit	V	nA	V	nA	-	-
Condition	IT(mA)	VR(V)	IT(mA)	VR(V)	-	-
	1	6.8	1	6.8	-	-
<b>Spec LSL</b>	<b>7</b>	<b>-</b>	<b>7</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Spec USL</b>	<b>-</b>	<b>1000</b>	<b>-</b>	<b>1000</b>	<b>5%</b>	<b>2</b>
Min	7.20	7.78	7.10	6.56	-2.1%	0.007
Max	7.29	52.57	7.29	54.22	1.0%	0.054
Avg	7.24	29.40	7.19	29.37	-0.7%	0.029
Sigma	0.03	13.34	0.06	16.41	0.8%	0.016
1	7.21	48.45	7.13	44.20	-1.1%	0.044
2	7.26	30.35	7.21	50.91	-0.7%	0.051
3	7.22	41.10	7.19	16.06	-0.4%	0.016
4	7.23	18.02	7.16	47.22	-1.0%	0.047
5	7.23	47.32	7.29	45.04	0.8%	0.045
6	7.22	27.67	7.16	11.10	-0.8%	0.011
7	7.27	33.03	7.12	7.59	-2.1%	0.008
8	7.27	32.34	7.29	48.13	0.3%	0.048
9	7.23	48.14	7.11	22.21	-1.7%	0.022
10	7.20	22.48	7.10	29.56	-1.4%	0.030
11	7.21	21.30	7.13	11.16	-1.1%	0.011
12	7.20	18.73	7.27	20.96	1.0%	0.021
13	7.24	25.13	7.20	39.11	-0.6%	0.039
14	7.21	39.96	7.15	46.81	-0.8%	0.047
15	7.25	12.06	7.29	47.98	0.6%	0.048
16	7.21	10.00	7.19	54.22	-0.3%	0.054
17	7.27	7.78	7.27	10.62	0.0%	0.011
18	7.27	26.90	7.14	22.87	-1.8%	0.023
19	7.22	52.57	7.13	6.56	-1.2%	0.007
20	7.26	20.07	7.18	11.45	-1.1%	0.011
21	7.28	43.32	7.18	25.32	-1.4%	0.025
22	7.29	20.18	7.24	27.14	-0.7%	0.027
<b>Fail Q'ty</b>	<b>0</b>					
<b>RESULT:</b>	<b>PASS</b>					

## solder ability

### Electrical Data

Request Part Number: MDFN1610A071S

Purpose: Reliability Plan

No.	Area without soldering		Result
1	<	5%	PASS
2	<	5%	PASS
3	<	5%	PASS
4	<	5%	PASS
5	<	5%	PASS
6	<	5%	PASS
7	<	5%	PASS
8	<	5%	PASS
9	<	5%	PASS
10	<	5%	PASS
11	<	5%	PASS
12	<	5%	PASS
13	<	5%	PASS
14	<	5%	PASS
15	<	5%	PASS
16	<	5%	PASS
17	<	5%	PASS
18	<	5%	PASS
19	<	5%	PASS
20	<	5%	PASS
21	<	5%	PASS
22	<	5%	PASS
<b>Fail Q'ty</b>	0		
<b>RESULT:</b>	PASS		

## High Temperature Storage Life Test

### Electrical Data

**Request Part Number:** MDFN1610A071S

**Purpose:** Reliability Plan

Read points	initial		96H		Δ%(VBR) within spec	Times(IR) within spec
	VBR1	IR1	VBR1	IR1		
Unit	V	nA	V	nA	-	-
Condition	IT(mA)	VR(V)	IT(mA)	VR(V)	-	-
	1	6.8	1	6.8	-	-
<b>Spec LSL</b>	<b>7</b>	<b>-</b>	<b>7</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Spec USL</b>	<b>-</b>	<b>1000</b>	<b>-</b>	<b>1000</b>	<b>5%</b>	<b>2</b>
Min	7.20	8.63	7.10	7.27	-2.3%	0.007
Max	7.29	54.07	7.29	54.54	1.1%	0.055
Avg	7.25	30.01	7.20	34.84	-0.7%	0.035
Sigma	0.03	13.82	0.07	15.24	1.1%	0.015
1	7.29	21.92	7.15	13.69	-1.9%	0.014
2	7.26	25.57	7.11	34.25	-2.1%	0.034
3	7.28	11.91	7.11	33.34	-2.3%	0.033
4	7.20	51.36	7.24	43.28	0.6%	0.043
5	7.22	39.26	7.27	37.36	0.7%	0.037
6	7.29	33.65	7.12	7.27	-2.3%	0.007
7	7.23	33.10	7.24	54.54	0.1%	0.055
8	7.27	27.31	7.23	21.14	-0.6%	0.021
9	7.24	23.77	7.12	48.19	-1.7%	0.048
10	7.23	8.70	7.18	17.70	-0.7%	0.018
11	7.22	13.93	7.22	50.49	0.0%	0.050
12	7.24	42.15	7.29	45.90	0.7%	0.046
13	7.28	53.61	7.28	22.48	0.0%	0.022
14	7.28	42.29	7.13	27.41	-2.1%	0.027
15	7.27	54.07	7.27	41.19	0.0%	0.041
16	7.23	17.20	7.17	48.58	-0.8%	0.049
17	7.20	34.97	7.28	52.77	1.1%	0.053
18	7.23	31.50	7.14	31.12	-1.2%	0.031
19	7.28	19.95	7.26	50.34	-0.3%	0.050
20	7.28	38.98	7.29	54.39	0.1%	0.054
21	7.24	8.63	7.10	11.30	-1.9%	0.011
22	7.26	26.42	7.12	19.78	-1.9%	0.020
<b>Fail Q'ty</b>	<b>0</b>					
<b>RESULT:</b>	<b>PASS</b>					

## Pressure Cooking Test

### Electrical Data

**Request Part Number:** MDFN1610A071S

**Purpose:** Reliability Plan

Read points	initial		96H		Δ%(VBR) within spec	Times(IR) within spec
	VBR1	IR1	VBR1	IR1		
Test	V	nA	V	nA	-	-
Condition	IT(mA)	VR(V)	IT(mA)	VR(V)	-	-
	1	6.8	1	6.8	-	-
<b>Spec LSL</b>	<b>7</b>	<b>-</b>	<b>7</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Spec USL</b>	<b>-</b>	<b>1000</b>	<b>-</b>	<b>1000</b>	<b>5%</b>	<b>2</b>
Min	7.20	5.40	7.10	5.71	-2.2%	0.006
Max	7.29	53.03	7.29	52.88	1.0%	0.053
Avg	7.24	26.04	7.18	26.04	-0.9%	0.026
Sigma	0.03	14.48	0.06	16.42	0.7%	0.016
1	7.29	19.24	7.29	42.44	0.0%	0.042
2	7.26	25.12	7.10	52.88	-2.2%	0.053
3	7.29	53.03	7.22	9.42	-1.0%	0.009
4	7.27	5.40	7.16	35.28	-1.5%	0.035
5	7.21	41.87	7.21	8.96	0.0%	0.009
6	7.22	10.01	7.29	11.58	1.0%	0.012
7	7.29	24.77	7.19	21.32	-1.4%	0.021
8	7.29	29.38	7.23	46.64	-0.8%	0.047
9	7.20	40.74	7.10	17.21	-1.4%	0.017
10	7.24	26.53	7.16	11.59	-1.1%	0.012
11	7.25	46.30	7.12	33.82	-1.8%	0.034
12	7.22	23.85	7.15	42.53	-1.0%	0.043
13	7.24	9.43	7.23	50.99	-0.1%	0.051
14	7.22	10.51	7.18	11.60	-0.6%	0.012
15	7.25	25.67	7.16	5.97	-1.2%	0.006
16	7.24	40.85	7.16	5.71	-1.1%	0.006
17	7.25	9.39	7.23	30.13	-0.3%	0.030
18	7.20	11.28	7.10	15.57	-1.4%	0.016
19	7.28	19.35	7.23	44.35	-0.7%	0.044
20	7.25	44.30	7.16	25.17	-1.2%	0.025
21	7.20	13.14	7.13	42.66	-1.0%	0.043
22	7.20	42.62	7.20	7.06	0.0%	0.007
<b>Fail Q'ty</b>	<b>0</b>					
<b>RESULT:</b>	<b>PASS</b>					