

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

**SMAJXXXA(CA)-MS**

---

**Product specification**

## Description

Transient voltage suppression diodes, also known as TVS diodes, are protective electronic parts that protect electrical equipment from voltage spikes introduced by wires.

## Applications

- computer system
- domestic appliance
- video input


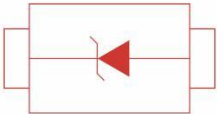


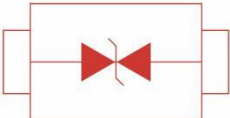

## Features

- For surface mounted applications
- Excellent clamping capability
- 400 W peak pulse power capability with a 10/1000 $\mu$ s Waveform.
- $V_{RWM}$  3.3-550V
- Low profile package and low inductance
- Typical IR less than 1 $\mu$ A above 10V
- Fast response time: typically less than 1.0ps from 0V to  $V_{BRmin}$ .

## Mechanical Characteristics

- Package: SMA/DO-214AC
- Case Material: Molded Plastic. UL Flammability
- Classification Rating 94V-0
- Moisture Sensitivity: Meet MSL 1
- Terminal: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Weight: 0.07g(Approximate)

## Reference News

PACKAGE OUTLINE	PIN CONFIGURATION	Marking Information
		
<b>Unipolar</b>		
		
<b>Bipolar</b>		

**Electrical Characteristics (T=25°C)**

Part Number		Marking		V <sub>R</sub>	I <sub>R</sub> @ V <sub>R</sub>	V <sub>BR</sub> @ I <sub>T</sub>		I <sub>T</sub>	V <sub>C</sub> @ I <sub>PP</sub>	I <sub>PP</sub> ⊙
Uni-Polar	Bi-Polar	Uni	Bi	V	μA	min(V)	max(V)	mA	max(V)	A
SMAJ3.3A-MS	/	SMAJ3.3A	/	3.3	200	5.2	6	10	8.0	50.00
SMAJ5.0A-MS	SMAJ5.0CA-MS	SMAJ5.0A	SMAJ5.0CA	5.0	800	6.40	7.00	10	9.2	43.48
SMAJ6.0A-MS	SMAJ6.0CA-MS	SMAJ6.0A	SMAJ6.0CA	6.0	800	6.67	7.37	10	10.3	38.84
SMAJ6.5A-MS	SMAJ6.5CA-MS	SMAJ6.5A	SMAJ6.5CA	6.5	500	7.22	7.98	10	11.2	35.72
SMAJ7.0A-MS	SMAJ7.0CA-MS	SMAJ7.0A	SMAJ7.0CA	7.0	200	7.78	8.60	10	12.0	33.34
SMAJ7.5A-MS	SMAJ7.5CA-MS	SMAJ7.5A	SMAJ7.5CA	7.5	100	8.33	9.21	1	12.9	31.01
SMAJ8.0A-MS	SMAJ8.0CA-MS	SMAJ8.0A	SMAJ8.0CA	8.0	50	8.89	9.83	1	13.6	29.42
SMAJ8.5A-MS	SMAJ8.5CA-MS	SMAJ8.5A	SMAJ8.5CA	8.5	20	9.44	10.40	1	14.4	27.78
SMAJ9.0A-MS	SMAJ9.0CA-MS	SMAJ9.0A	SMAJ9.0CA	9.0	10	10.00	11.10	1	15.4	25.98
SMAJ10A-MS	SMAJ10CA-MS	SMAJ10A	SMAJ10CA	10.0	5	11.10	12.30	1	17.0	23.53
SMAJ11A-MS	SMAJ11CA-MS	SMAJ11A	SMAJ11CA	11.0	1	12.20	13.50	1	18.2	21.98
SMAJ12A-MS	SMAJ12CA-MS	SMAJ12A	SMAJ12CA	12.0	1	13.30	14.70	1	19.9	20.11
SMAJ13A-MS	SMAJ13CA-MS	SMAJ13A	SMAJ13CA	13.0	1	14.40	15.90	1	21.5	18.61
SMAJ14A-MS	SMAJ14CA-MS	SMAJ14A	SMAJ14CA	14.0	1	15.60	17.20	1	23.2	17.25
SMAJ15A-MS	SMAJ15CA-MS	SMAJ15A	SMAJ15CA	15.0	1	16.70	18.50	1	24.4	16.40
SMAJ16A-MS	SMAJ16CA-MS	SMAJ16A	SMAJ16CA	16.0	1	17.80	19.70	1	26.0	15.39
SMAJ17A-MS	SMAJ17CA-MS	SMAJ17A	SMAJ17CA	17.0	1	18.90	20.90	1	27.6	14.50
SMAJ18A-MS	SMAJ18CA-MS	SMAJ18A	SMAJ18CA	18.0	1	20.00	22.10	1	29.2	13.70
SMAJ20A-MS	SMAJ20CA-MS	SMAJ20A	SMAJ20CA	20.0	1	22.20	24.50	1	32.4	12.35
SMAJ22A-MS	SMAJ22CA-MS	SMAJ22A	SMAJ22CA	22.0	1	24.40	26.90	1	35.5	11.27
SMAJ24A-MS	SMAJ24CA-MS	SMAJ24A	SMAJ24CA	24.0	1	26.70	29.50	1	38.9	10.29
SMAJ26A-MS	SMAJ26CA-MS	SMAJ26A	SMAJ26CA	26.0	1	28.90	31.90	1	42.1	9.51
SMAJ28A-MS	SMAJ28CA-MS	SMAJ28A	SMAJ28CA	28.0	1	31.10	34.40	1	45.4	8.82
SMAJ30A-MS	SMAJ30CA-MS	SMAJ30A	SMAJ30CA	30.0	1	33.30	36.80	1	48.4	8.27
SMAJ33A-MS	SMAJ33CA-MS	SMAJ33A	SMAJ33CA	33.0	1	36.70	40.60	1	53.3	7.51
SMAJ36A-MS	SMAJ36CA-MS	SMAJ36A	SMAJ36CA	36.0	1	40.00	44.20	1	58.1	6.89
SMAJ40A-MS	SMAJ40CA-MS	SMAJ40A	SMAJ40CA	40.0	1	44.40	49.10	1	64.5	6.21
SMAJ43A-MS	SMAJ43CA-MS	SMAJ43A	SMAJ43CA	43.0	1	47.80	52.80	1	69.4	5.77
SMAJ45A-MS	SMAJ45CA-MS	SMAJ45A	SMAJ45CA	45.0	1	50.00	55.30	1	72.7	5.51
SMAJ48A-MS	SMAJ48CA-MS	SMAJ48A	SMAJ48CA	48.0	1	53.30	58.90	1	77.4	5.17
SMAJ51A-MS	SMAJ51CA-MS	SMAJ51A	SMAJ51CA	51.0	1	56.70	62.70	1	82.4	4.86
SMAJ54A-MS	SMAJ54CA-MS	SMAJ54A	SMAJ54CA	54.0	1	60.00	66.30	1	87.1	4.60
SMAJ58A-MS	SMAJ58CA-MS	SMAJ58A	SMAJ58CA	58.0	1	64.40	71.20	1	93.6	4.28
SMAJ60A-MS	SMAJ60CA-MS	SMAJ60A	SMAJ60CA	60.0	1	66.70	73.70	1	96.8	4.14
SMAJ64A-MS	SMAJ64CA-MS	SMAJ64A	SMAJ64CA	64.0	1	71.10	78.60	1	103.0	3.89
SMAJ70A-MS	SMAJ70CA-MS	SMAJ70A	SMAJ70CA	70.0	1	77.80	86.00	1	113.0	3.54
SMAJ75A-MS	SMAJ75CA-MS	SMAJ75A	SMAJ75CA	75.0	1	83.30	92.10	1	121.0	3.31
SMAJ78A-MS	SMAJ78CA-MS	SMAJ78A	SMAJ78CA	78.0	1	86.70	95.80	1	126.0	3.18
SMAJ85A-MS	SMAJ85CA-MS	SMAJ85A	SMAJ85CA	85.0	1	94.40	104.0	1	137.0	2.92

**Electrical Characteristics (T=25°C)**

Part Number		Marking		V <sub>R</sub>	I <sub>R@V<sub>R</sub></sub>	V <sub>BR@I<sub>T</sub></sub>		I <sub>T</sub>	V <sub>C@I<sub>PP</sub></sub>	I <sub>PP</sub> <sup>①</sup>
Uni- Polar	Bi- Polar	Uni	Bi	V	μA	min(V)	max(V)	mA	max(V)	A
SMAJ90A-MS	SMAJ90CA-MS	SMAJ90A	SMAJ90CA	90.0	1	100.0	111.0	1	146.0	2.74
SMAJ100A-MS	SMAJ100CA-MS	SMAJ100A	SMAJ100CA	100.0	1	111.0	123.0	1	162.0	2.47
SMAJ110A-MS	SMAJ110CA-MS	SMAJ110A	SMAJ110CA	110.0	1	122.0	135.0	1	177.0	2.26
SMAJ120A-MS	SMAJ120CA-MS	SMAJ120A	SMAJ120CA	120.0	1	133.0	147.0	1	193.0	2.08
SMAJ130A-MS	SMAJ130CA-MS	SMAJ130A	SMAJ130CA	130.0	1	144.0	159.0	1	209.0	1.92
SMAJ150A-MS	SMAJ150CA-MS	SMAJ150A	SMAJ150CA	150.0	1	167.0	185.0	1	243.0	1.65
SMAJ160A-MS	SMAJ160CA-MS	SMAJ160A	SMAJ160CA	160.0	1	178.0	197.0	1	259.0	1.55
SMAJ170A-MS	SMAJ170CA-MS	SMAJ170A	SMAJ170CA	170.0	1	189.0	209.0	1	275.0	1.46
SMAJ180A-MS	SMAJ180CA-MS	SMAJ180A	SMAJ180CA	180.0	1	201.0	222.0	1	292.0	1.37
SMAJ190A-MS	SMAJ190CA-MS	SMAJ190A	SMAJ190CA	190.0	1	209.0	233.0	1	308.0	1.30
SMAJ200A-MS	SMAJ200CA-MS	SMAJ200A	SMAJ200CA	200.0	1	224.0	247.0	1	324.0	1.24
SMAJ210A-MS	SMAJ210CA-MS	SMAJ210A	SMAJ210CA	210.0	1	237.0	263.0	1	340.0	1.18
SMAJ220A-MS	SMAJ220CA-MS	SMAJ220A	SMAJ220CA	220.0	1	246.0	272.0	1	356.0	1.13
SMAJ250A-MS	SMAJ250CA-MS	SMAJ250A	SMAJ250CA	250.0	1	279.0	309.0	1	405.0	0.99
SMAJ300A-MS	SMAJ300CA-MS	SMAJ300A	SMAJ300CA	300.0	1	335.0	371.0	1	486.0	0.83
SMAJ350A-MS	SMAJ350CA-MS	SMAJ350A	SMAJ350CA	350.0	1	391.0	432.0	1	567.0	0.71
SMAJ400A-MS	SMAJ400CA-MS	SMAJ400A	SMAJ400CA	400.0	1	447.0	494.0	1	648.0	0.62
SMAJ440A-MS	SMAJ440CA-MS	SMAJ440A	SMAJ440CA	440.0	1	492.0	543.0	1	713.0	0.57
SMAJ550A-MS	SMAJ550CA-MS	SMAJ550A	SMAJ550CA	550.0	1	614.7	679.4	1	972.0	0.42

**Notes:**

① Surge waveform: 10/1000μs

 V<sub>R</sub> : Stand-off Voltage -- Maximum voltage that can be applied

 V<sub>BR</sub>: Breakdown Voltage

 V<sub>C</sub>: Clamping Voltage -- Peak voltage measured across the suppressor at a specified I<sub>pp</sub>

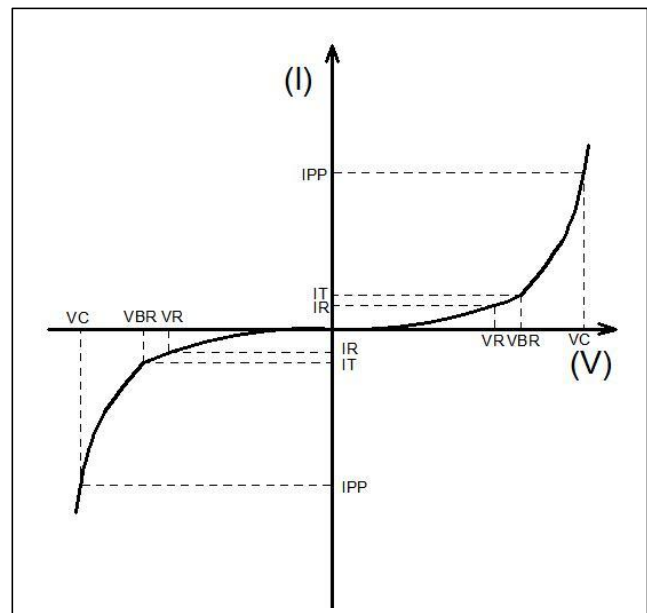
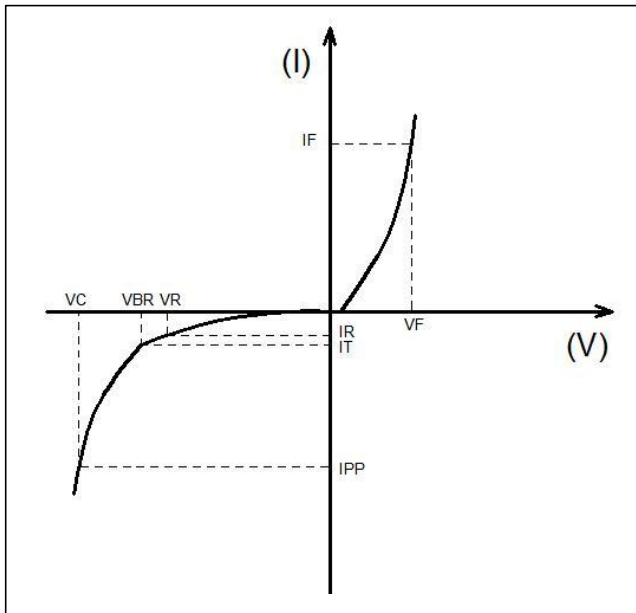
 I<sub>R</sub>: Reverse Leakage Current

**Absolute Maximum Ratings(T=25°C, RH=45%-75%, unless otherwise noted)**

Parameter	Symbol	Value	Unit
Peak pulse power dissipation on 10/ 1000µs waveform	P <sub>PP</sub>	400	W
Steady state power dissipation at T <sub>L</sub> =75°C	P <sub>M(AV)</sub>	1.0	W
Operating junction temperature range	T <sub>j</sub>	-55 to +125	°C
Storage temperature range	T <sub>stg</sub>	-55 to +150	°C

**Ratings And V-I Characteristics Curves (T=25°C, unless otherwise noted)**

FIG1: V-I cure characteristics



Symbol	Parameter
I <sub>F</sub>	Mean Forward Current
V <sub>F</sub>	Maximum Forward Voltage @ I <sub>F</sub>
V <sub>R</sub>	Peak Reverse Working Voltage
I <sub>R</sub>	Reverse Leakage Current @ V <sub>R</sub>
V <sub>BR</sub>	Breakdown Voltage @ I <sub>T</sub>
I <sub>T</sub>	Test Current
I <sub>PP</sub>	Maximum Reverse Peak Pulse Current
V <sub>C</sub>	Clamping Voltage @ I <sub>PP</sub>

Typical Characteristics

FIG2: Pulse Derating Curve

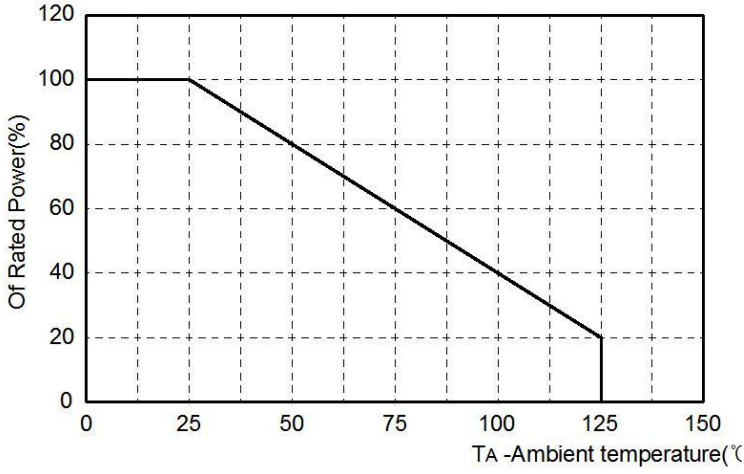


FIG3: Pulse Wavefor

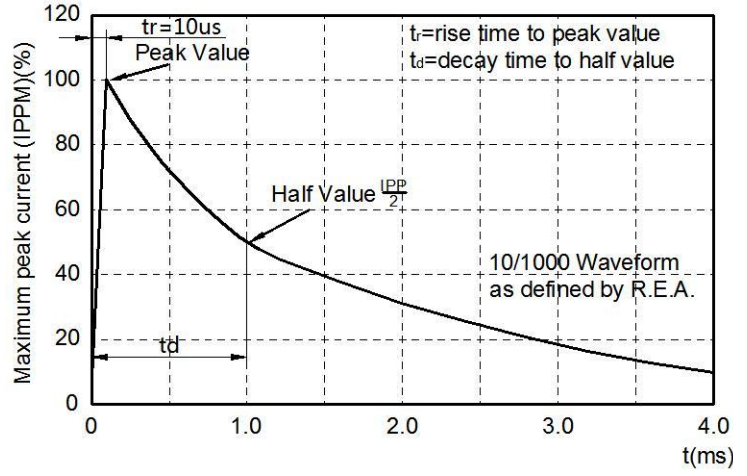


FIG4: Peak Pulse Power Rating Curve

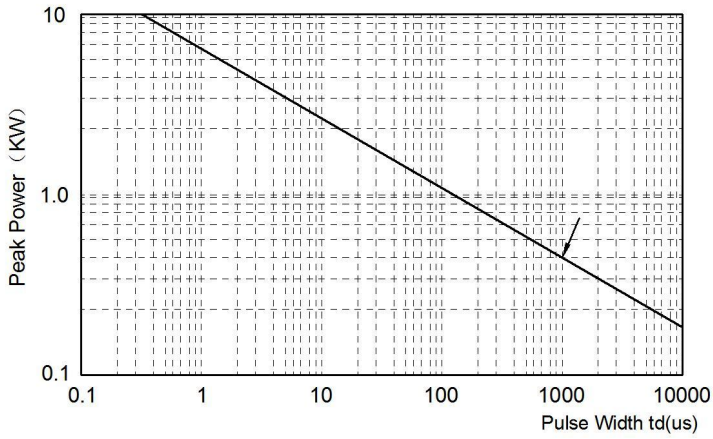
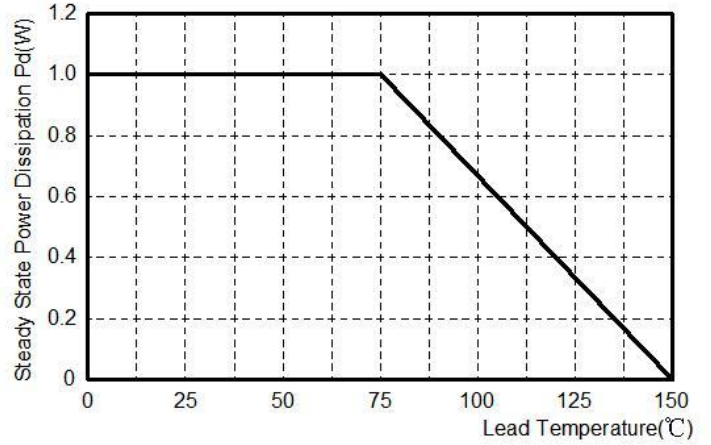
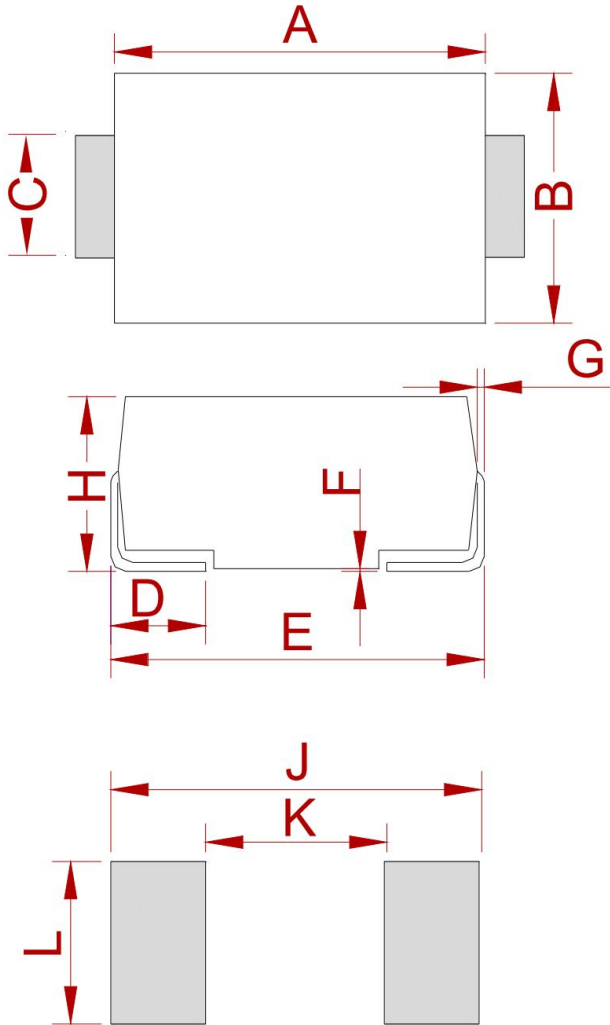


FIG5: Steady State Power Dissipation



**PACKAGE MECHANICAL DATA**



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.25	4.65	0.167	0.183
B	2.50	2.90	0.098	0.114
C	1.35	1.65	0.053	0.065
D	0.76	1.52	0.030	0.060
E	4.93	5.28	0.194	0.208
F	0.051	0.203	0.002	0.008
G	0.15	0.31	0.006	0.012
H	1.98	2.41	0.078	0.095
J	6.50		0.256	
K		2.30		0.090
L	1.70		0.067	

**REEL SPECIFICATION**

P/N	PKG	QTY
SMAJXXXA(CA)-MS	SMA	2000

## Attention

- Any and all MSKSEMI Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your MSKSEMI Semiconductor representative nearest you before using any MSKSEMI Semiconductor products described or contained herein in such applications.
- MSKSEMI Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all MSKSEMI Semiconductor products described or contained herein.
- Specifications of any and all MSKSEMI Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- MSKSEMI Semiconductor strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all MSKSEMI Semiconductor products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of MSKSEMI Semiconductor.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. MSKSEMI Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the MSKSEMI Semiconductor product that you intend to use.