

Temperature Switch IC With Hysteresis

MM3488xxxRRE Datasheet

DESCRIPTION

Temperature Switch IC With Hysteresis

FEATURES

- Low current consumption
- Small package
- Hysteresis function

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Model Name

M M 3 4 8 8 X X X R R E

Series Name(A)(B)(C)(D)(E)

(A)		(B)	
Hysteresis Temperature (T _{HYS})		Detecting Temperature (T _{DET})	
A	T _{HYS} =5.0deg.C	60	T _{DET} =+60deg.C
B	T _{HYS} =10deg.C	∞	T _{DET} is 1.0deg.C setps
C	T _{HYS} =15deg.C	90	T _{DET} =+90deg.C

(C)		(D)	
Package		Packing Specifications	
R	SSON-4B	R	R HOUSING *SSON-4B_Standard
		L	L HOUSING

(E)	
E	EMBOSS TAPE

R No. table

Taping : R housing

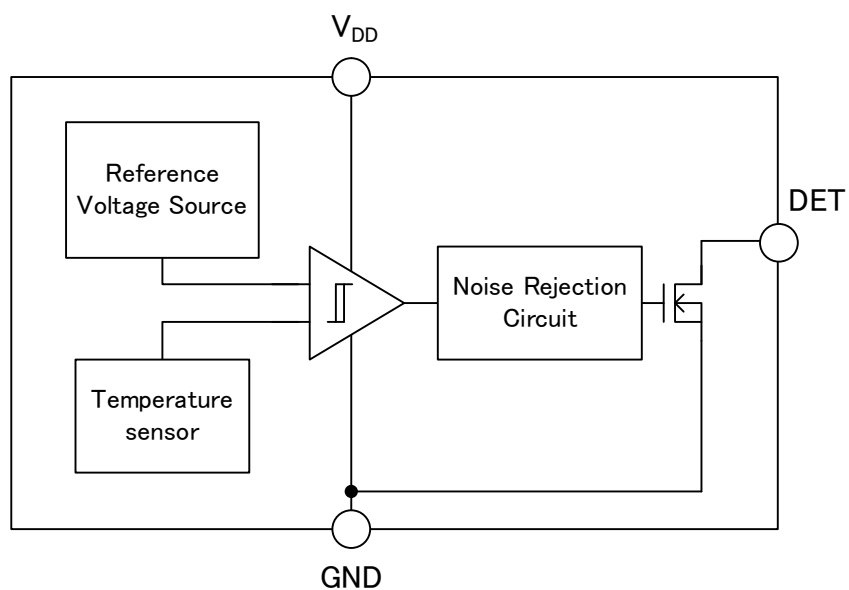
Parts No.	T _{DET} (deg.C)	T _{HYS} (deg.C)	R No.(R59)
MM3488A60RRE	60	5.0	E221
MM3488A61RRE	61		E222
MM3488A62RRE	62		E223
MM3488A63RRE	63		E224
MM3488A64RRE	64		E225
MM3488A65RRE	65		E226
MM3488A66RRE	66		E227
MM3488A67RRE	67		E228
MM3488A68RRE	68		E229
MM3488A69RRE	69		E230
MM3488A70RRE	70		E231
MM3488A71RRE	71		E232
MM3488A72RRE	72		E233
MM3488A73RRE	73		E234
MM3488A74RRE	74		E235
MM3488A75RRE	75		E236
MM3488A76RRE	76		E237
MM3488A77RRE	77		E238
MM3488A78RRE	78		E239
MM3488A79RRE	79		E240
MM3488A80RRE	80		E241
MM3488A81RRE	81		E242
MM3488A82RRE	82		E243
MM3488A83RRE	83		E244
MM3488A84RRE	84		E245
MM3488A85RRE	85		E246
MM3488A86RRE	86		E247
MM3488A87RRE	87		E248
MM3488A88RRE	88		E249
MM3488A89RRE	89		E250
MM3488A90RRE	90		E251

Parts No.	T _{DET} (deg.C)	T _{HYS} (deg.C)	R No.(R59)
MM3488B60RRE	60	10	E252
MM3488B61RRE	61		E253
MM3488B62RRE	62		E254
MM3488B63RRE	63		E255
MM3488B64RRE	64		E256
MM3488B65RRE	65		E257
MM3488B66RRE	66		E258
MM3488B67RRE	67		E259
MM3488B68RRE	68		E260
MM3488B69RRE	69		E261
MM3488B70RRE	70		E262
MM3488B71RRE	71		E263
MM3488B72RRE	72		E264
MM3488B73RRE	73		E265
MM3488B74RRE	74		E266
MM3488B75RRE	75		E267
MM3488B76RRE	76		E268
MM3488B77RRE	77		E269
MM3488B78RRE	78		E270
MM3488B79RRE	79		E271
MM3488B80RRE	80		E272
MM3488B81RRE	81		E273
MM3488B82RRE	82		E274
MM3488B83RRE	83		E275
MM3488B84RRE	84		E276
MM3488B85RRE	85		E277
MM3488B86RRE	86		E278
MM3488B87RRE	87		E279
MM3488B88RRE	88		E280
MM3488B89RRE	89		E281
MM3488B90RRE	90		E282

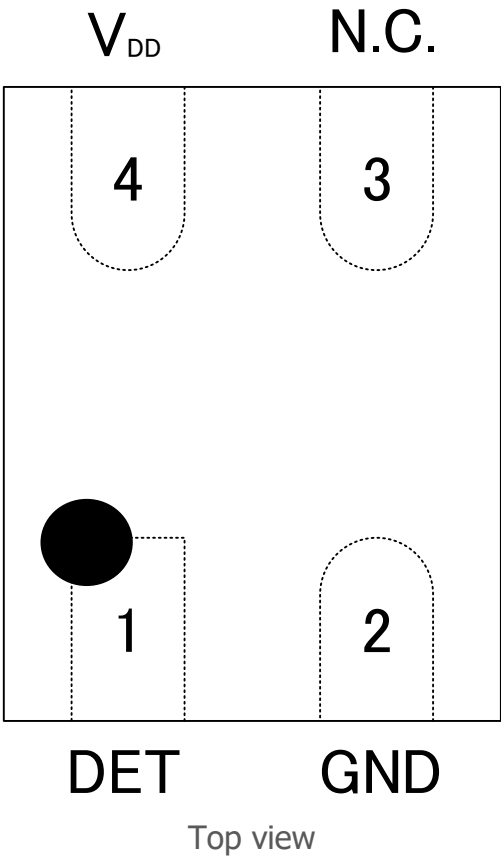
Taping: R housing

Parts No.	T _{DET} (deg.C)	T _{HYS} (deg.C)	R No.(R59)
MM3488C60RRE	60	15	E283
MM3488C61RRE	61		E284
MM3488C62RRE	62		E285
MM3488C63RRE	63		E286
MM3488C64RRE	64		E287
MM3488C65RRE	65		E288
MM3488C66RRE	66		E289
MM3488C67RRE	67		E290
MM3488C68RRE	68		E291
MM3488C69RRE	69		E292
MM3488C70RRE	70		E293
MM3488C71RRE	71		E294
MM3488C72RRE	72		E295
MM3488C73RRE	73		E296
MM3488C74RRE	74		E297
MM3488C75RRE	75		E298
MM3488C76RRE	76		E299
MM3488C77RRE	77		E300
MM3488C78RRE	78		E301
MM3488C79RRE	79		E302
MM3488C80RRE	80		E303
MM3488C81RRE	81		E304
MM3488C82RRE	82		E305
MM3488C83RRE	83		E306
MM3488C84RRE	84		E307
MM3488C85RRE	85		E308
MM3488C86RRE	86		E309
MM3488C87RRE	87		E310
MM3488C88RRE	88		E311
MM3488C89RRE	89		E312
MM3488C90RRE	90		E313

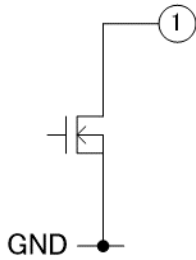
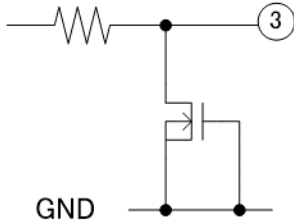
BLOCK DIAGRAM



PIN CONFIGURATION



TERMINAL EXPLANATIONS

PIN No.	SYMBOL	FUNCTION	INTERNAL EQUIVALENT CIRCUIT
1	DET	Temp.Detect Output Pin	
2	GND	Ground pin	-
3	N.C. (note ¹)	N.C. (Testing pin)	
4	V _{DD}	Power supply pin	-

note¹: Testing pin is connected with the internal circuit for testing.
When resistance and capacity are connected with Testing pin, this product produce improper operating signals.
Please set Testing pin to the open state.

ABSOLUTE MAXIMUM RATINGS

(Ta=25deg.C, unless otherwise specified)

ITEM	SYMBOL	MIN.	MAX.	UNIT
Supply voltage	V _{DDmax}	-0.3	6	V
Terminal Voltage	DET _{max}	-0.3	6	V
Storage temperature	T _{stg}	-55	125	deg.C
Power Dissipation	P _d	-	150	mW

RECOMMENDED OPERATING CONDITIONS

ITEM	SYMBOL	MIN.	MAX.	UNIT
Operating Ambient temperature	T _{opr}	-30	105	deg.C
Operating Supply Voltage	V _{DDopr}	1.6	5.0	V

ELECTRICAL CHARACTERISTICS

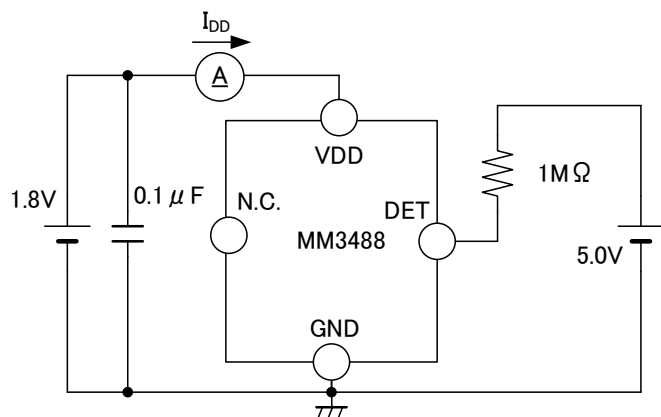
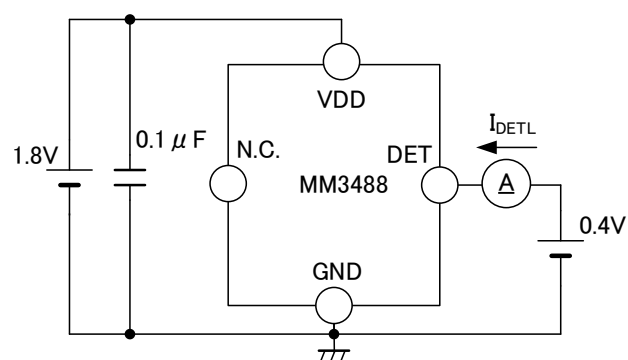
(Ta=25deg.C, VDD=1.8V, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Operating Supply Voltage	V _{DD}	T _{DET} =60~90deg.C	1.6	1.8	5.0	V
Detecting Temperature Accuracy (note ²)	T _{DETAC1}	V _{DD} =1.6~3.3V	-2.0	0.0	+2.0	deg.C
	T _{DETAC2}	V _{DD} =3.3~5.0V	-1.5	+0.5	+2.5	
Hysteresis Temperature (note ³)	T _{HYS}	T _{HYS} =5.0deg.C	2.5	5.0	7.5	deg.C
		T _{HYS} =10deg.C	7.0	10.0	13.0	
		T _{HYS} =15deg.C	10.5	15.0	19.5	
DET Sink Current	I _{DETL}	V _{DET} =0.4V, V _{DET} =Low Level	4.0	12.0	-	mA
DET Leak Current	I _{LEAK}	V _{DD} =5.0V, V _{DET} =High Level	-	-	0.1	μA
Supply Current	I _{DD}		-	1.5	3.5	μA
Noise Rejection Time	t _{noise}	Ta=+60~+90deg.C	-	250	500	μs
VDD Start-up Response	t _{VS}	R _{PULL-UP} = 1MΩ	-	100	500	μs

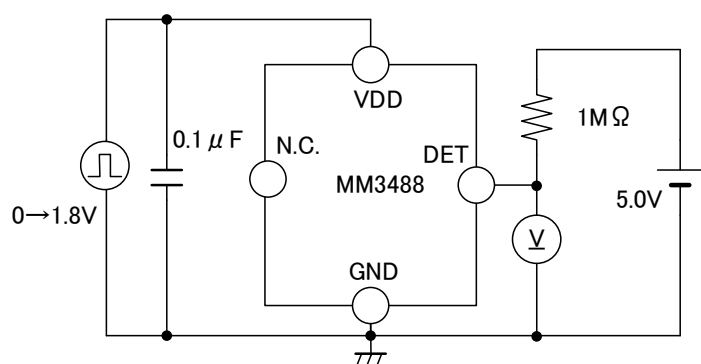
note²: Detection temperature can be selected in 1.0deg.C steps (+60~+90deg.C).note³: Hysteresis temperature can be selected in 5.0deg.C steps (5.0deg.C, 10deg.C, 15deg.C).

TEST CIRCUIT

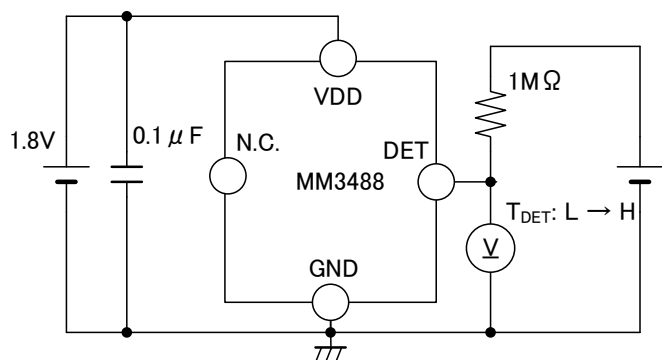
1. Supply Current

2. DET Sink Current
State of DET output Low level

3. Start-up Response

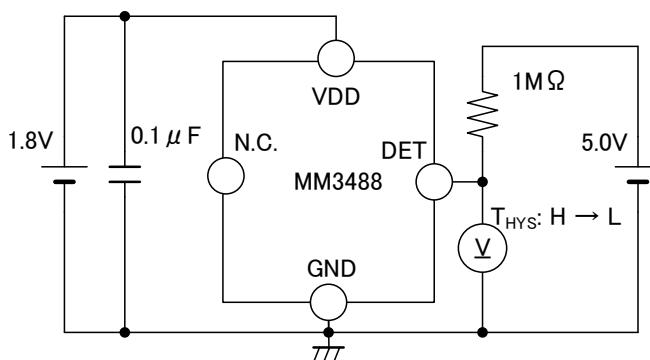


4. Detecting Temperature



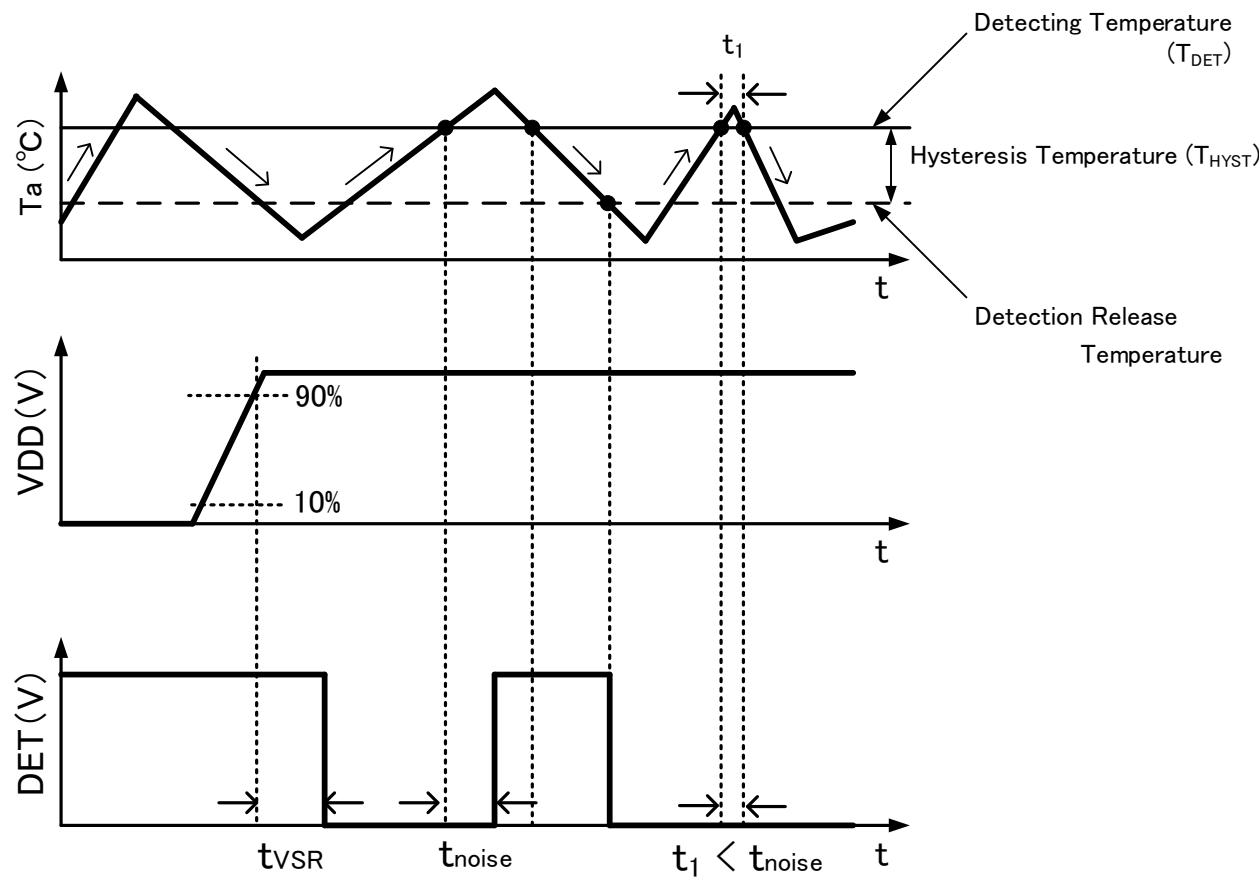
L: State of DET output Low level
H: State of DET output Low level
Ta = +40 → +100deg.C

5. Hysteresis Temperature

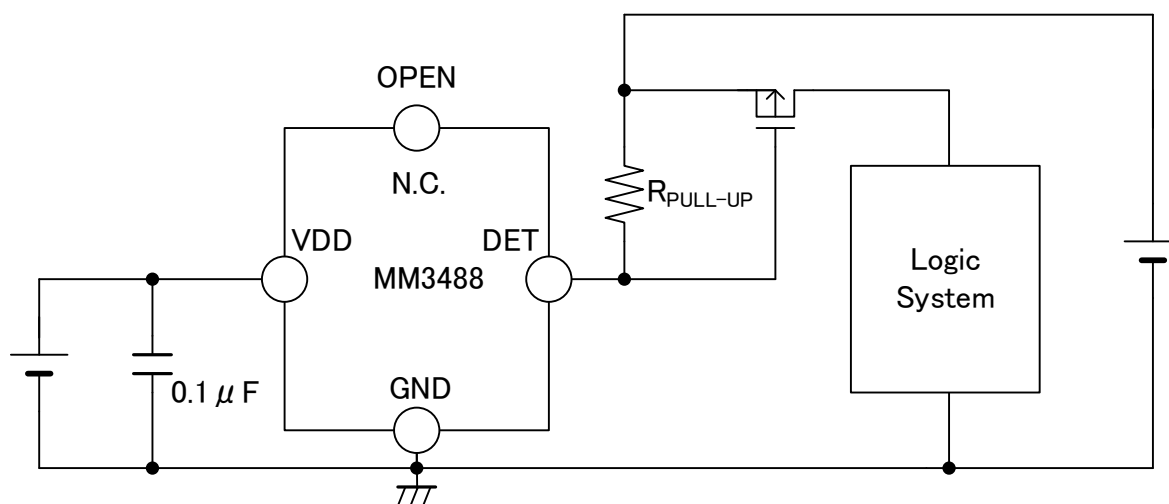


L: State of DET output Low level
H: State of DET output Low level
Ta = +100 → +40deg.C

TIMING CHART



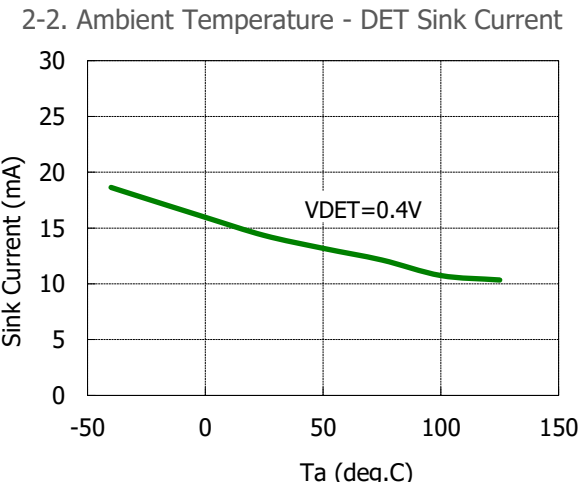
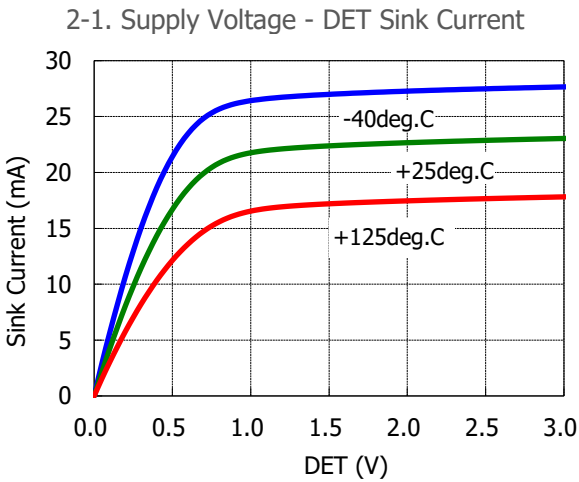
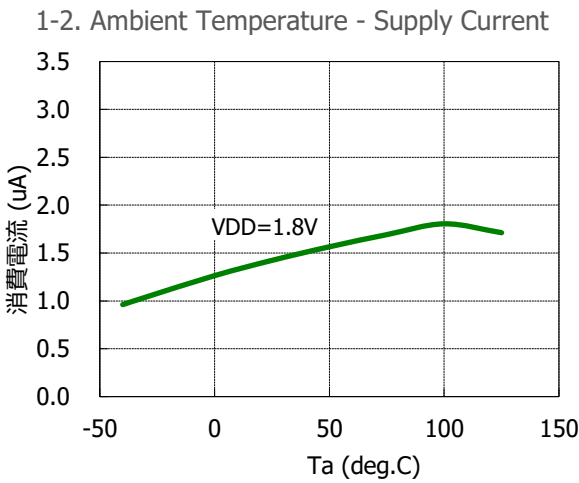
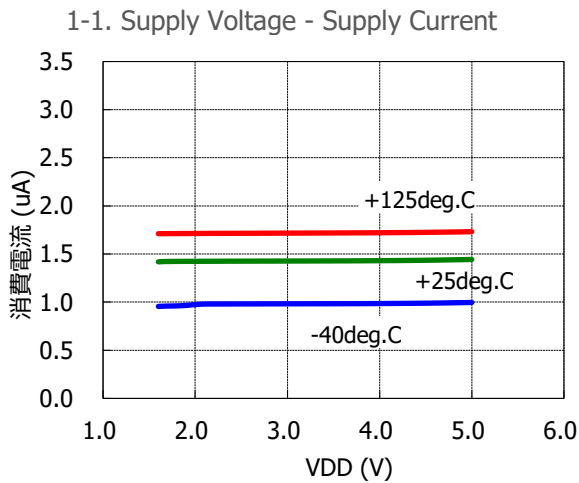
TYPICAL APPLICATION CIRCUIT



- We shall not be liable for any trouble or damage caused by using this circuit.
- In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, Mitsumi Electric Co., Ltd. Shall not be liable for any such problem, nor grant a license therefore.

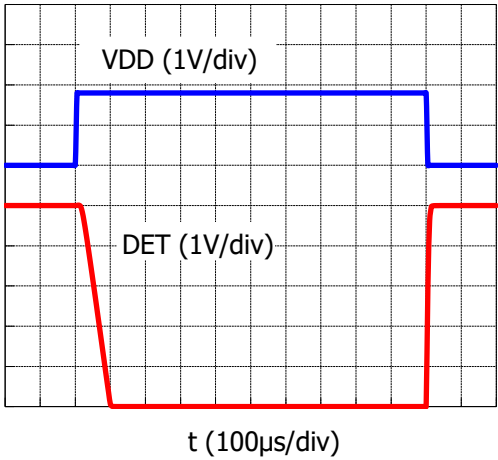
TYPICAL PERFORMANCE CHARACTERISTICS

(Ta=25deg.C, unless otherwise specified)

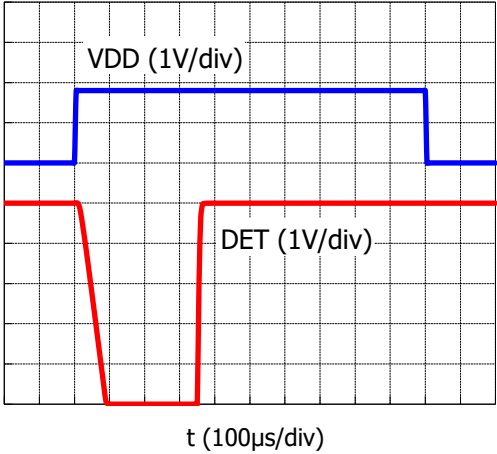


(Ta=25deg.C, unless otherwise specified)

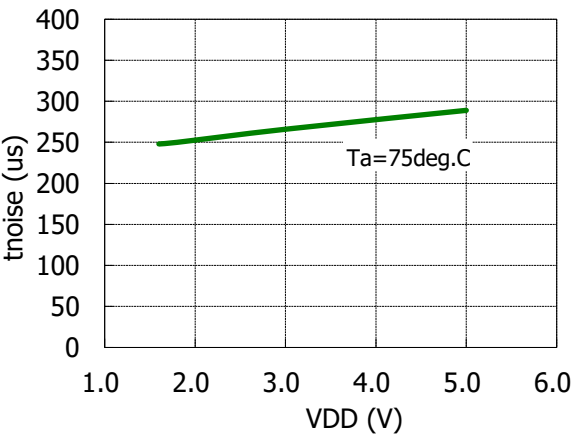
3-1. Start-up Response (Ta<TDET)



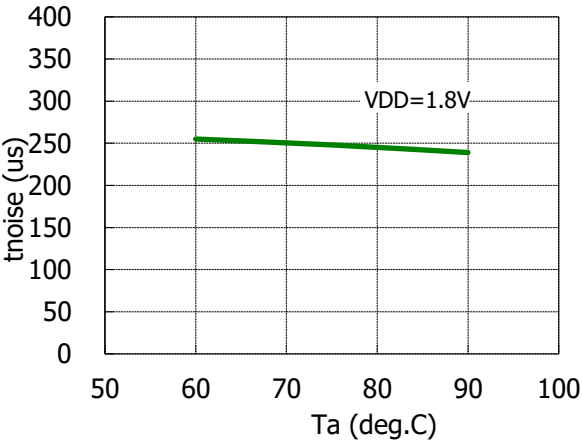
3-2. Start-up Response (Ta≥TDET)



4-1. Supply Voltage - Noise Rejection Time



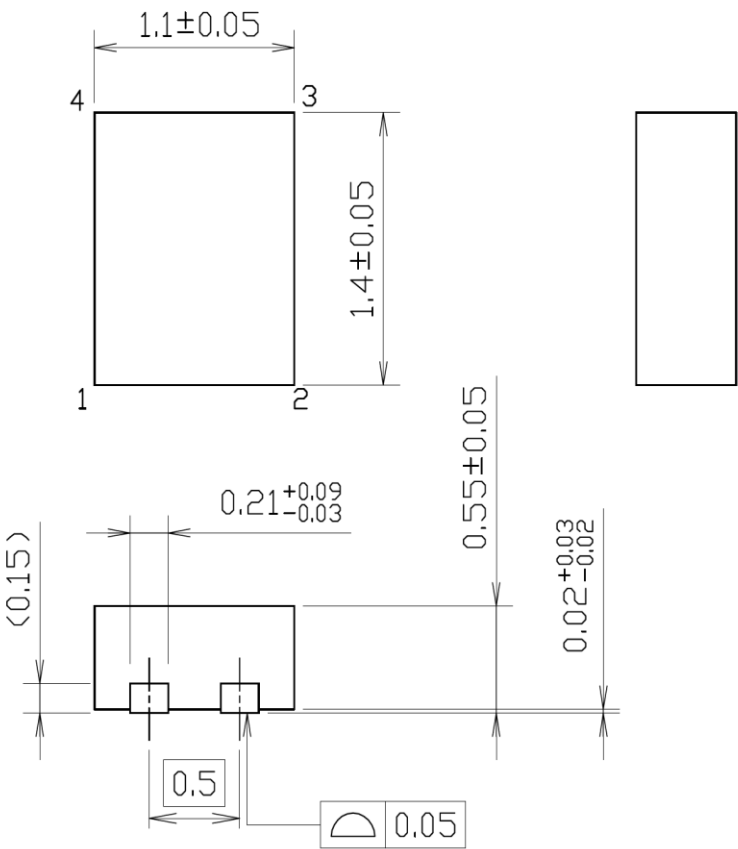
4-2. Ambient Temparture - Noise Rejection Time



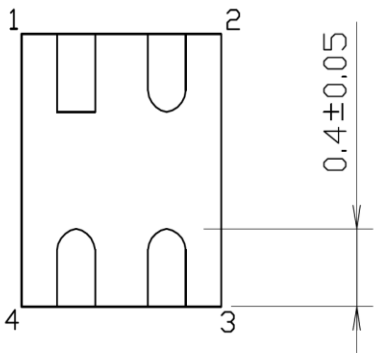
DIMENSIONS

PACKAGE: SSON-4B

UNIT	mm
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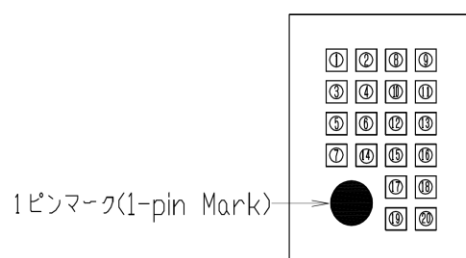


裏面 (BOTTOM VIEW)



No.R04-SSON4B-0001

MARKING CONTENTS



① ~ ⑦: ロットNo.表記用ドット(Date Code Dots)

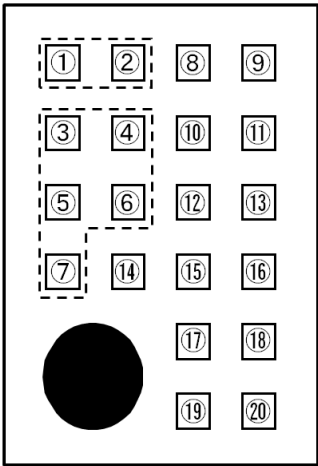
⑧ ~ ⑩: 機種名表示用ドット(Model No. Dots)

枠はドット位置を示す。(The frame shows the position of the dot.)

Model name	Model No.						
	⑭	⑮	⑯	⑰	⑱	⑲	⑳
MM3488AxxRRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
MM3488BxxRRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MM3488CxxRRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Model name	Model No.						
	⑧	⑨	⑩	⑪	⑫	⑬	
MM3488x60RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x61RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x62RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MM3488x63RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x64RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x65RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x66RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MM3488x67RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x68RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x69RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x70RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MM3488x71RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x72RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x73RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x74RRE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
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MM3488x76RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x77RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x78RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MM3488x79RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x80RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x81RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x82RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MM3488x83RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x84RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x85RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x86RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
MM3488x87RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x88RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MM3488x89RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
MM3488x90RRE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

How to identify SSON-4B (dot type) package lot numbers.



1. The ① and ② shows the production year (western calendar) but only 4 year cycles.

Mark		Year
①	②	
<input type="checkbox"/>	<input type="checkbox"/>	2013
<input type="checkbox"/>	<input checked="" type="checkbox"/>	2014
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2015
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2016

Mark		Year
①	②	
<input type="checkbox"/>	<input type="checkbox"/>	2017
<input type="checkbox"/>	<input checked="" type="checkbox"/>	2018
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2019
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2020

Mark		Year
①	②	
<input type="checkbox"/>	<input type="checkbox"/>	2021
<input type="checkbox"/>	<input checked="" type="checkbox"/>	2022
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2023
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2024

Mark		Year
①	②	
<input type="checkbox"/>	<input type="checkbox"/>	2025
<input type="checkbox"/>	<input checked="" type="checkbox"/>	2026
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2027
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2028

Mark		Year
①	②	
<input type="checkbox"/>	<input type="checkbox"/>	2029
<input type="checkbox"/>	<input checked="" type="checkbox"/>	2030
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2031
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2032

2. The ③ to ⑦ dot shows the production week.

Mark					Week
③	④	⑤	⑥	⑦	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1, 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3, 4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5, 6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	7, 8
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9, 10
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	11, 12
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13, 14
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	15, 16
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17, 18

Mark					Week
③	④	⑤	⑥	⑦	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	19, 20
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	21, 22
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	23, 24
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<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	31, 32
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	33, 34
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	35, 36

Mark					Week
③	④	⑤	⑥	⑦	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	37, 38
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<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	51, 52
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	53

3. Other dot shows the model details.

NOTES

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- To investigate the influence by applied transient load or external noise, It is necessary to evaluate and confirm them with mounting this product to the actual application.
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- This product is not designed to withstand radioactivity, and must avoid using in a radioactive environment.

MITSUMI ELECTRIC CO., LTD.

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