

RAA2900034H12HPD

INTELLIGENT POWER DEVICE

R07DS1342EJ0102
Rev.1.02
Feb. 28, 2020

1. Overview

1.1 Description

RAA290003 is designed for 2Wheeler Flasher driver with double frequency flashing in low load current condition.

1.2 Features

- High side driver
- Low on-state resistance
- Small package; TO252-3
- Short circuit protection
 - Over temperature protection with current limitation control
- Built-in auto flashing operation with only one external capacitor
- Built-in double frequency flashing in low load condition
- Active clamp operation at inductive load switch off
- RoHS compliant

1.3 Application

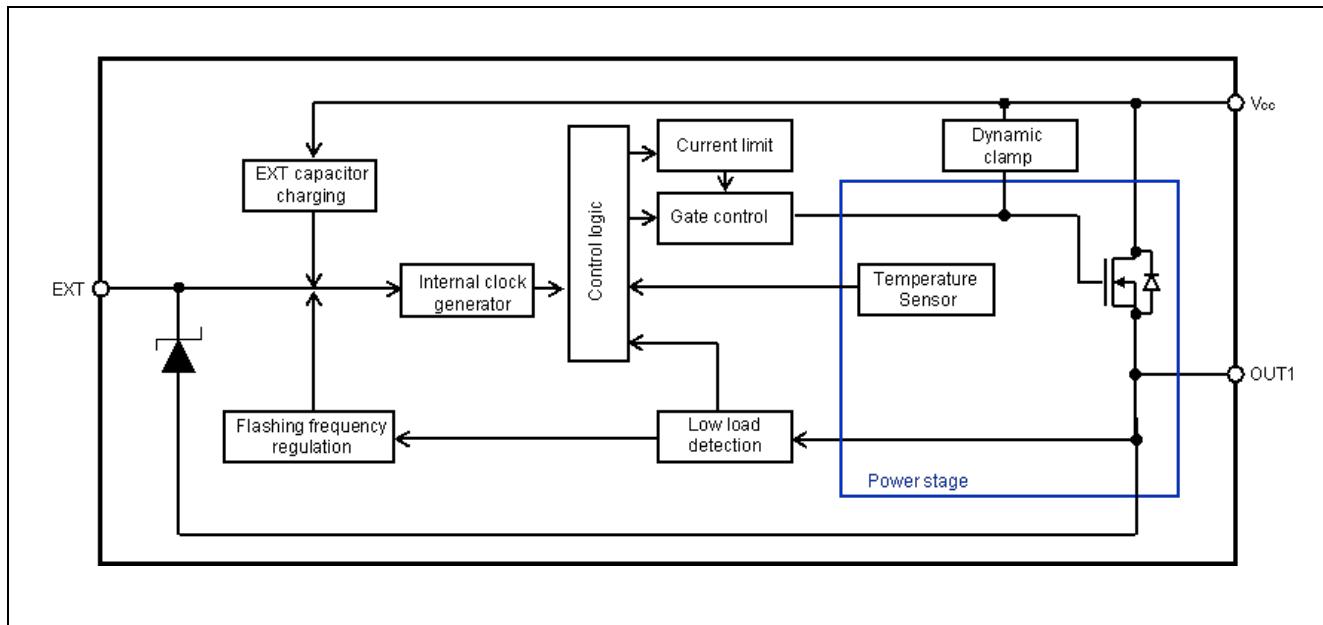
- 2Wheeler Flasher bulb switching

2. Ordering Information

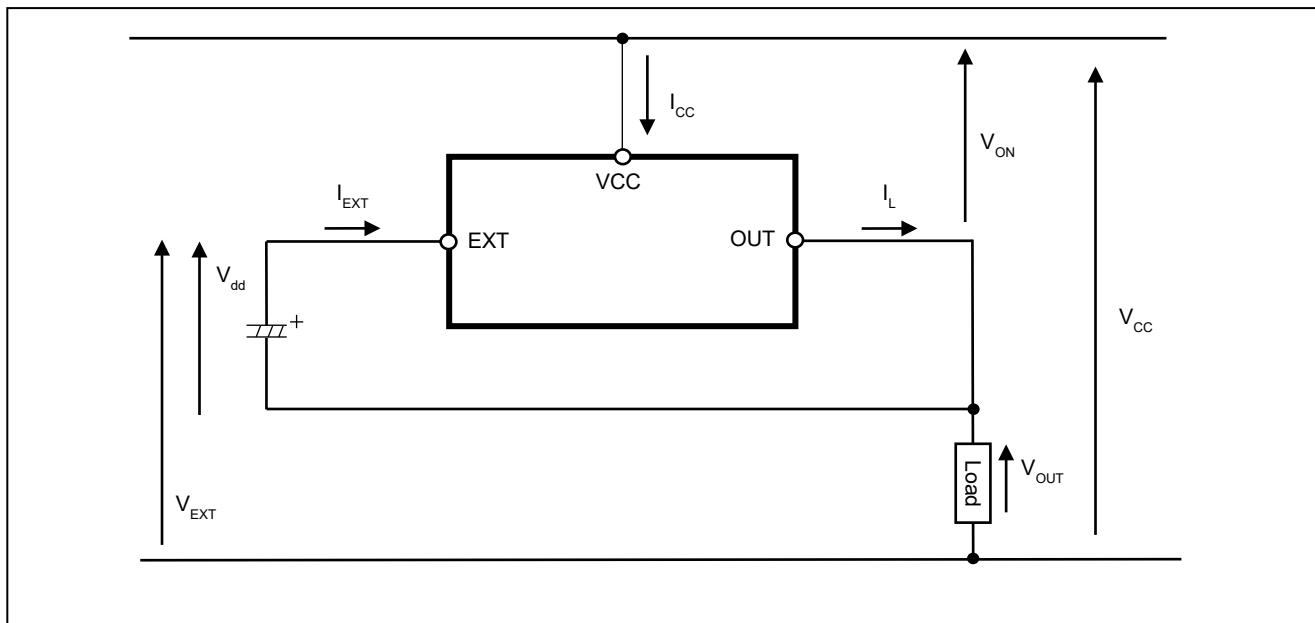
Part No.	Lead plating	Packing	Package
RAA2900034H12HPD	Pure Sn	Tape 2500pcs /reel	TO252 (MP-3ZP)

3. Specification

3.1 Block Diagram



3.2 Current and Voltage definition



3.3 Pin Configuration

Pin No.	Terminal Name
1	EXT
2/4	VCC
3	OUT



Pin function

Terminal Name	Pin function	Recommended connection
EXT	An external capacitor is connected between EXT pin and OUT pin. This capacitor stores power supply to the device during on-state and sets the flashing frequency.	Connected to OUT pin with 220uF capacitor
VCC	Positive power supply for logic supply as well as output power supply	
OUT	Protected high-side power output channel	

3.4 Absolute Maximum Ratings

Ta=25degreeC, unless other specified

Parameter	Symbol	Rating	Unit	Test Condition		
Vcc Voltage	V _{CC}	28	V			
Vcc Voltage at reverse battery condition	-V _{CC}	-16	V	RL=Nominal load, Refer 3.8.4, t<2min		
Output Drain to Source Voltage	V _{DSS}	42	V	RL=Nominal load, Refer 3.8.4, t = 200 ms		
Load Current	I _L	Self limited	A			
OUT Reverse Current at reverse battery condition	-I _L	-5	A	t<2min		
Total power dissipation for whole device (DC)	P _D	1.7	W	Ta=85degreeC, Device on 50mmx50mmx1.5mm epoxy PCB FR4 with 6 cm ² of 70 um copper area		
Voltage between EXT and OUT	V _{dd}	6.5	V			
Channel Temperature	T _{ch}	-40 to +150	degreeC			
Storage Temperature	T _{stg}	-55 to +150	degreeC			
ESD susceptibility	V _{ESD}	2000	V	HBM	AEC-Q100-002 std. R=1.5kohm, C=100pF	All pin
		4000			IEC61000-4-2 std. R=330ohm, C=150pF, 100nF at VCC and OUT	VCC, OUT
		200	V	MM	AEC-Q100-003 std. R=0ohm, C=200pF	

3.5 Recommended Operation Condition

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Ambient temperature	T _a	-20		85	degreeC	
Power supply voltage	V _{CC}	9		16	V	

3.6 Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Thermal characteristics	R _{th} (ch-a)		38		degree C/W	According to JEDEC JESD51-2, -5, -7 on FR4 2s2p board
	R _{th} (ch-c)		5		degree C/W	

3.7 Electrical Characteristics

Operation function

Tch=-40 to 150degreeC, Vcc=9 to 16V, 220uF between EXT and OUT, unless otherwise specified

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition		
Operating Voltage	V _{CC}	9		28	V	V _{on} <0.4V, RL=Nominal load, Refer 3.8.4		
		7.0		9.0	V	Auto flashing operation RL=Nominal load, Refer 3.8.4		
On-state resistance	R _{on}		16		mohm	Tch=25°C	RL=Nominal load, Refer 3.8.4	
				48		Tch=150°C		
Slew rate on	dV/dton	0.04		1.0	V/μs	VCC=13.5V, RL=Nominal load, Refer 3.8.4, Refer 3.8.5		
Slew rate off	-dV/dtoff	0.04		1.0	V/μs			
Turn on delay time after power supply on 1)	t _{d(on)}			100	ms	VCC=13.5V, Tch=-20 to 85°C, RL=Nominal load, , Refer 3.8.4, Refer 3.8.5		
Nominal operation frequency	f _{nom}	1.25	1.4	1.58	Hz	Vcc=13.5V	Tch=25°C, RL=Nominal load, Refer 3.8.4	
		0.66				Vcc=7.0 to 9V	Tch=-20 to 85°C, RL=Nominal load, Refer 3.8.4	
		1.12	1.4	1.68		Vcc=9 to 16V		
On duty rate	d _{on}	35		60	%	Tch=-20 to 85°C, RL=Nominal load, Refer 3.8.4		
Internal clock high level between EXT and OUT	V _{extH}		6.10		V	VCC=13.5V		
Internal clock low level between EXT and OUT	V _{extL}		4.95		V	VCC=13.5V		
EXT clamp voltage	V _{dd,clamp}		7		V	I _{EXT} =2mA, V _{on} =0V		
EXT reverse clamp voltage	V _{dd,rev}		-0.7		V	I _{EXT} =-2mA, V _{on} =0V		
Supply current via EXT pin	I _{EXT}		708		μA	V _{on} =0V, V _{ext} =5.5V, Tch=25°C		
Double frequency flashing threshold	Id _{ff}	1.75	2.06	2.40	A	VCC=9V, Tch=-20 to 85°C		
		2.21	2.60	3.03		VCC=13.5V, Tch=-20 to 85°C		
		2.45	2.88	3.36		VCC=16V, Tch=-20 to 85°C		

1) not subjected production test, guaranteed by design

Protection function

Tch=-40 to 150degreeC, Vcc=9 to 16V, unless other wise specified

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition	
Current limitation	I _{L(LIM)}		42		A	VCC=13.5V	
Absolute thermal shutdown temperature	a _{Tth}	150			degreeC		

3.8 Feature Description

3.8.1 Normal operation

When a nominal load such as defined 3.8.4 is connected to OUT pin, device operate with auto flashing mode by charging EXT capacitor up to the Vexth quickly, and then discharging EXT capacitor down to Vextl slowly with constant current IEXT.

Auto flashing operation frequency is determined following formula. Duty cycle is approx. 50%.

$$f_{nom} = \frac{I_{EXT}}{2 \times C_{EXT} \times (V_{exth} - V_{extl})}$$

3.8.2 Double flashing operation at low load current condition

If load current is lower than Idff during on-state, device detects low load condition, and start double flashing operation automatically.

3.8.3 Short circuit protection

The device shuts down automatically when $T_{ch} > aT_{th}$ is detected.

Absolute thermal toggling

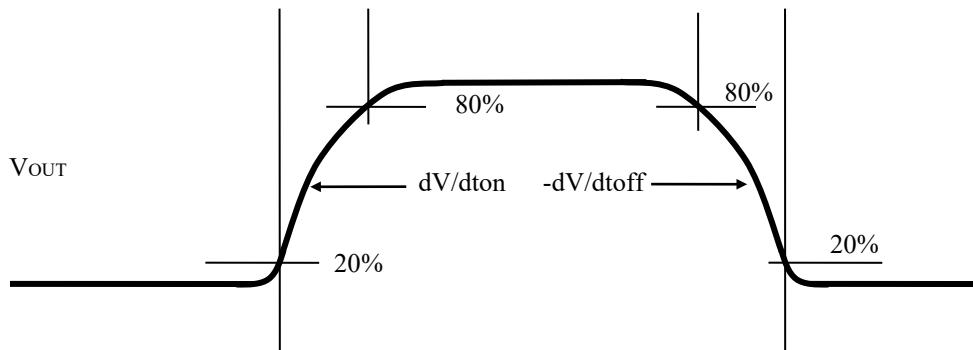
Current limitation control with IL(LIM) when auto restart from absolute T_{ch} protection.

3.8.4 Nominal load

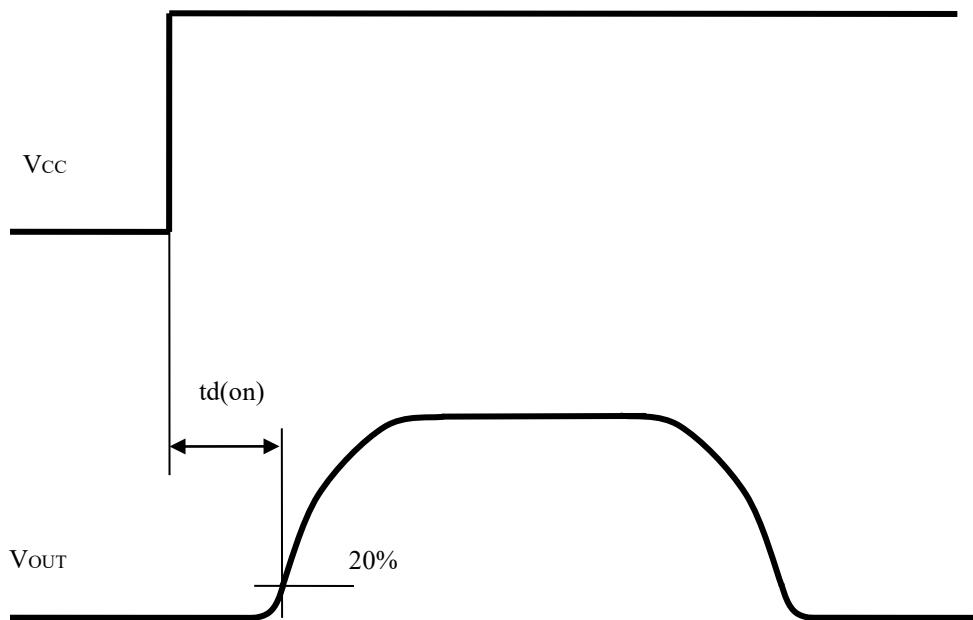
Product	Nominal load
RAA290003	3.4ohm

3.8.5 Measurement condition

Switching waveform of OUT terminal

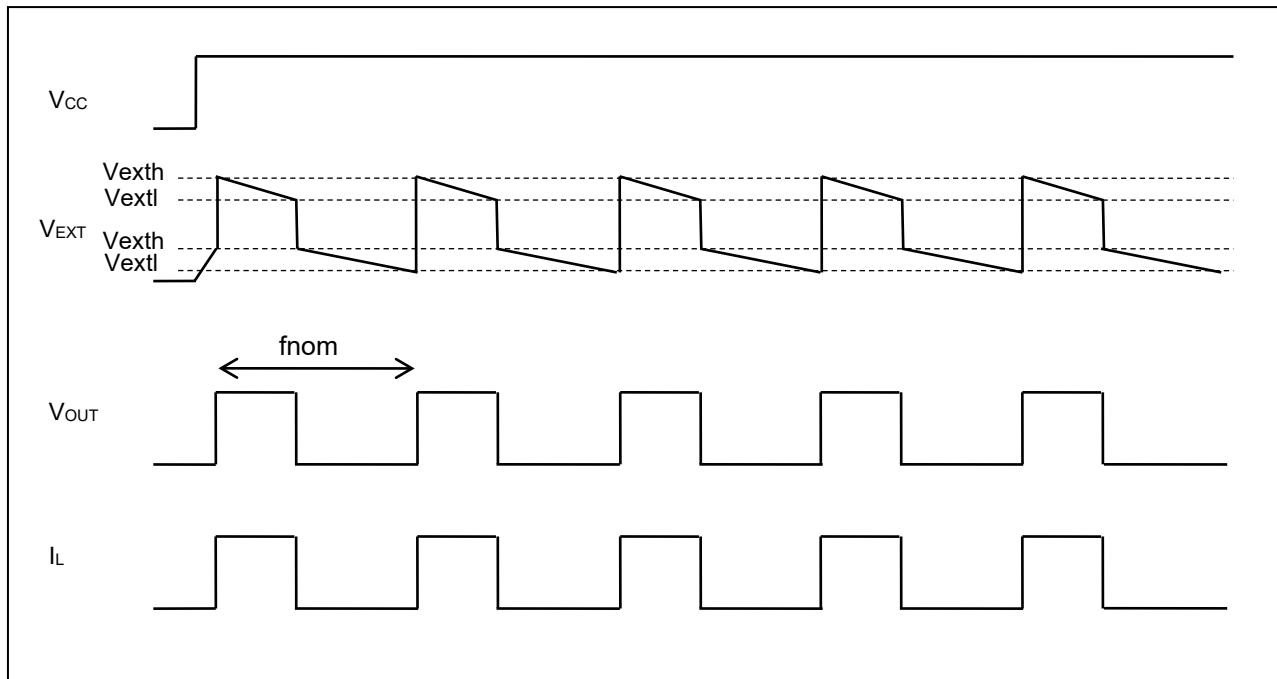


Turn on delay time after Power Supply on

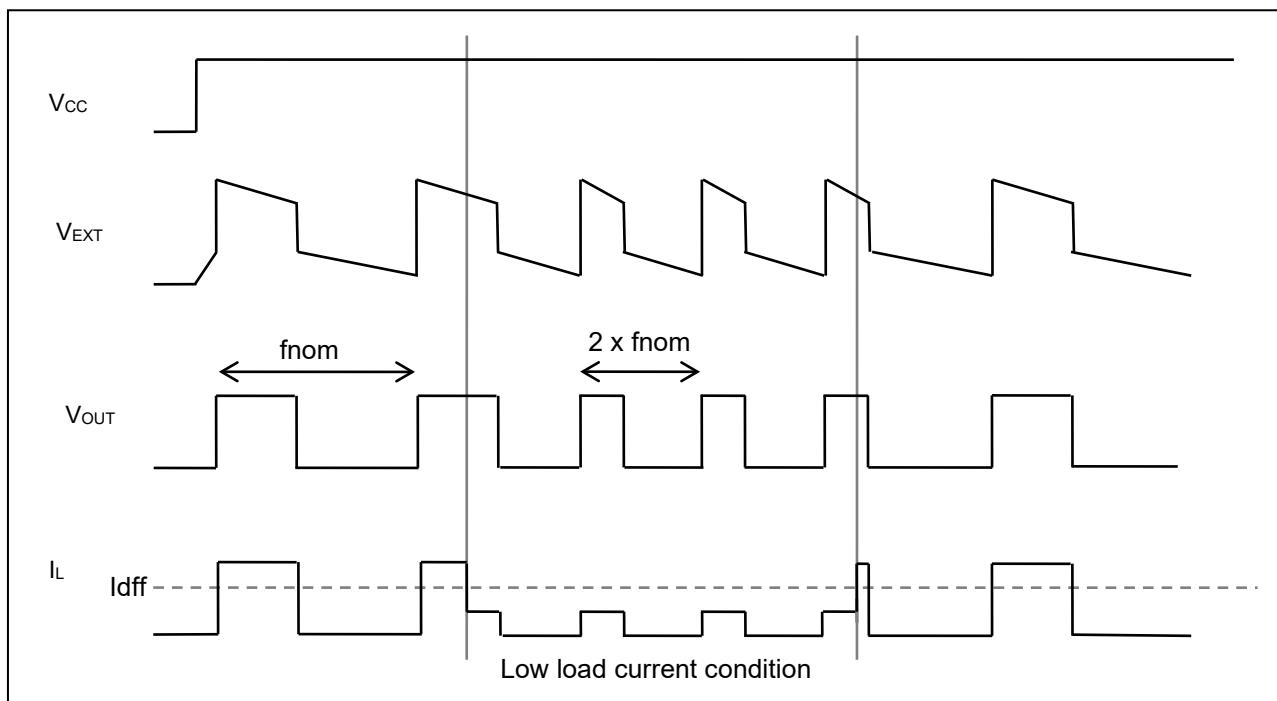


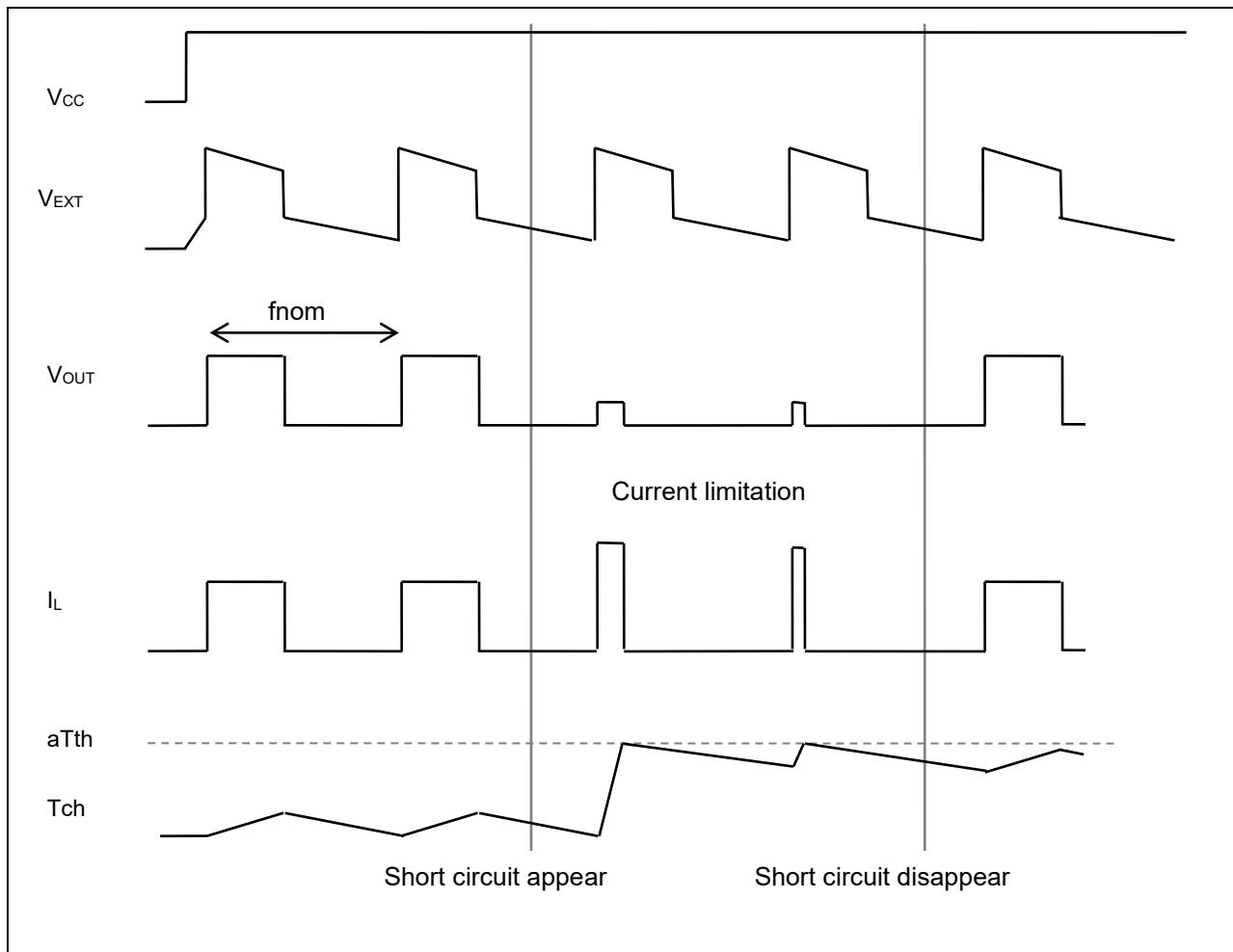
3.8.6 Timing chart

Nominal Operation



Double flashing operation at low load current condition

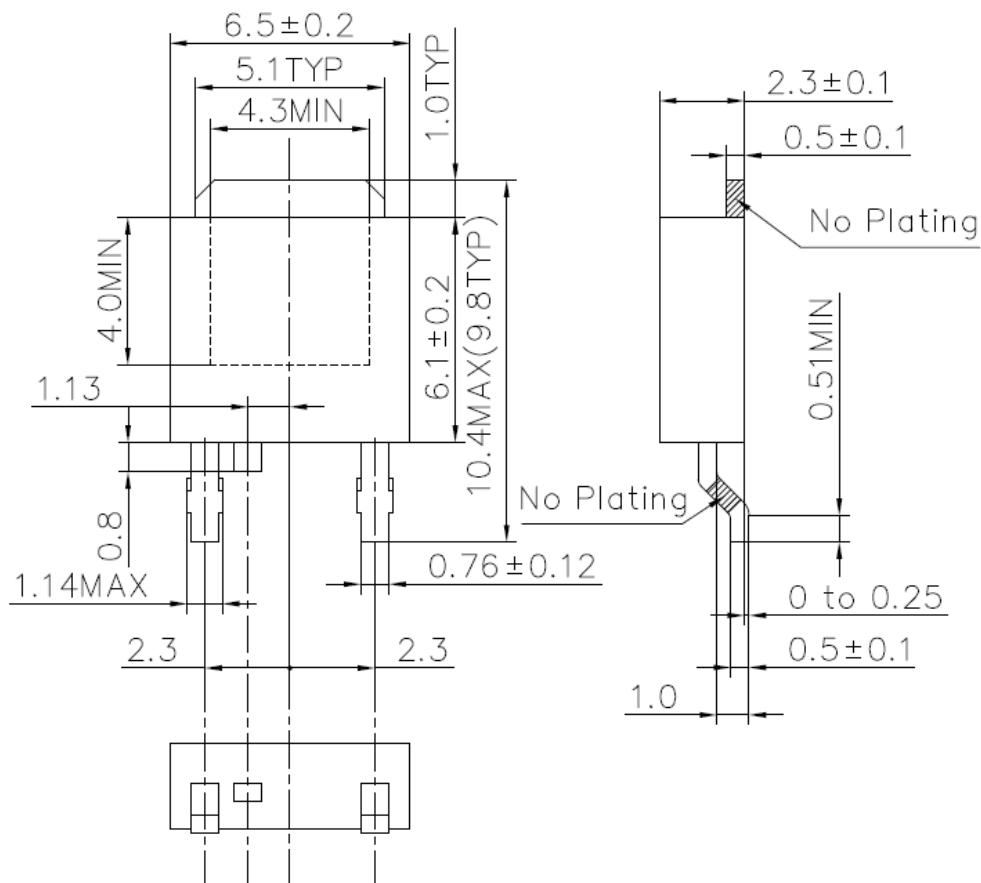


Short circuit protection

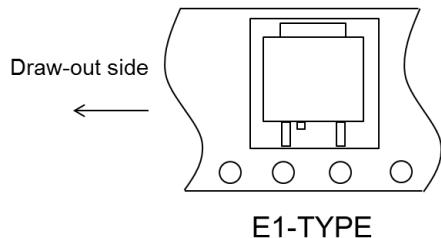
3.9 Package drawing

JEITA Package Code	Renesas Code	Previous Code	Mass(TYP.)[g]
-	PRSS0004ZP-A	P3J5-230-512	0.3

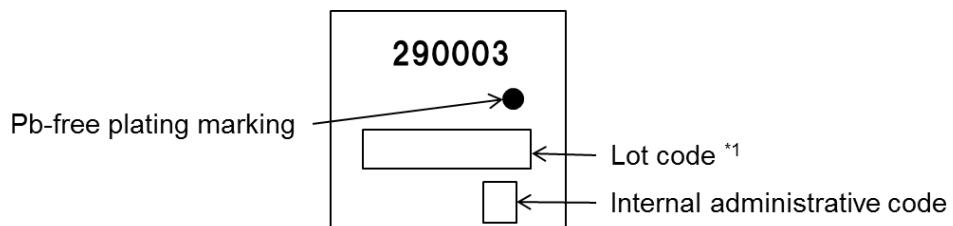
Unit : mm



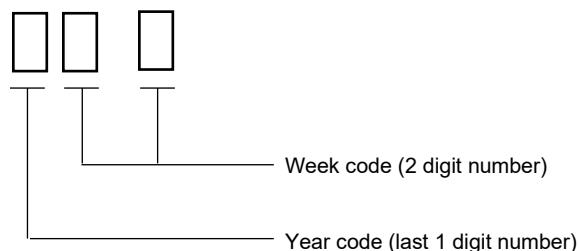
3.10 Taping information



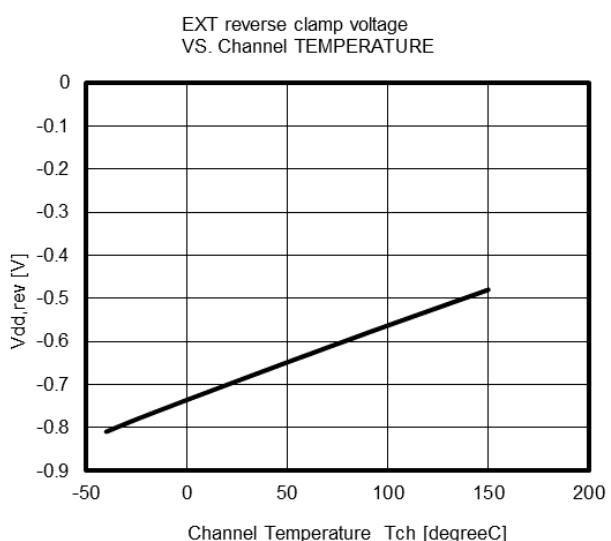
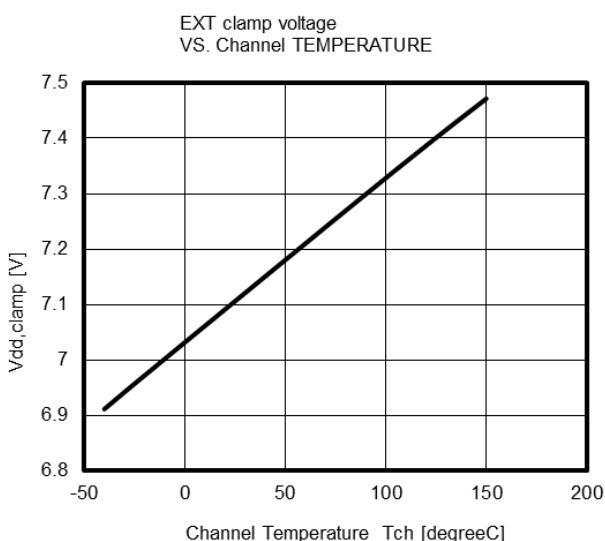
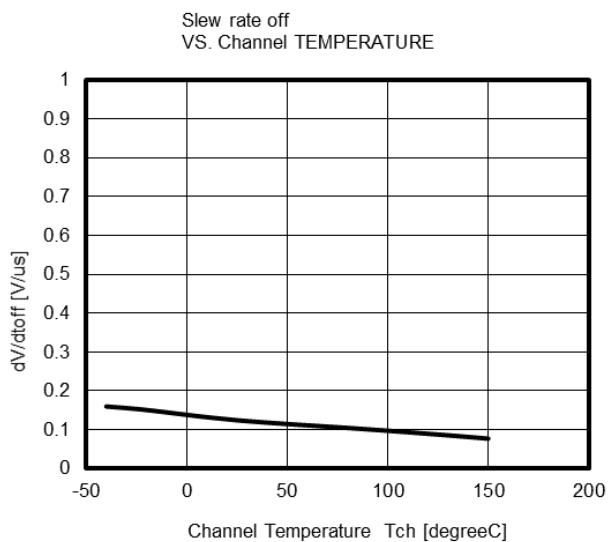
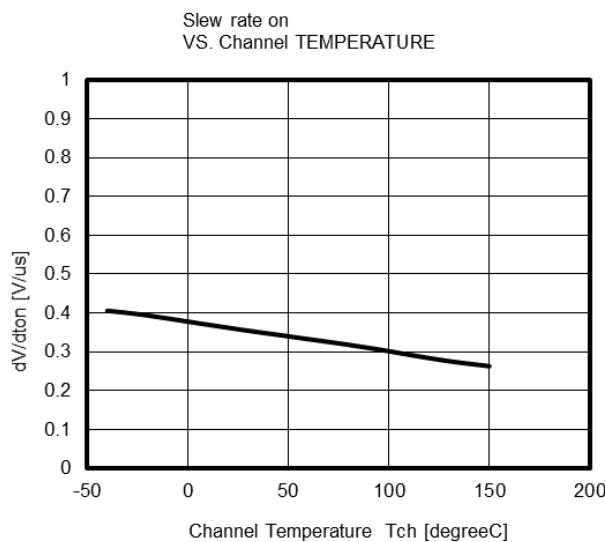
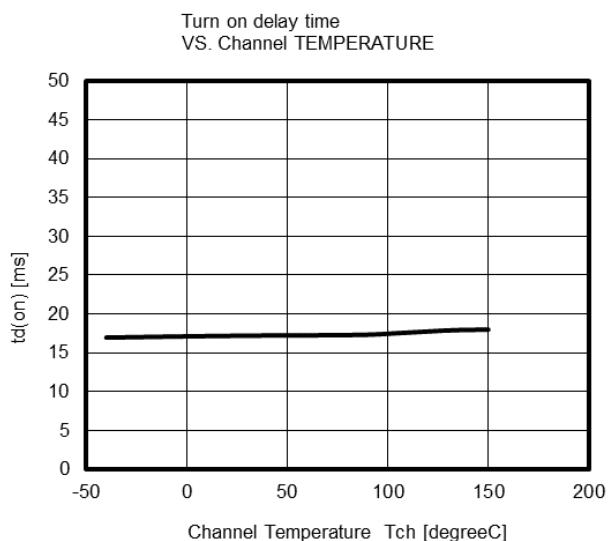
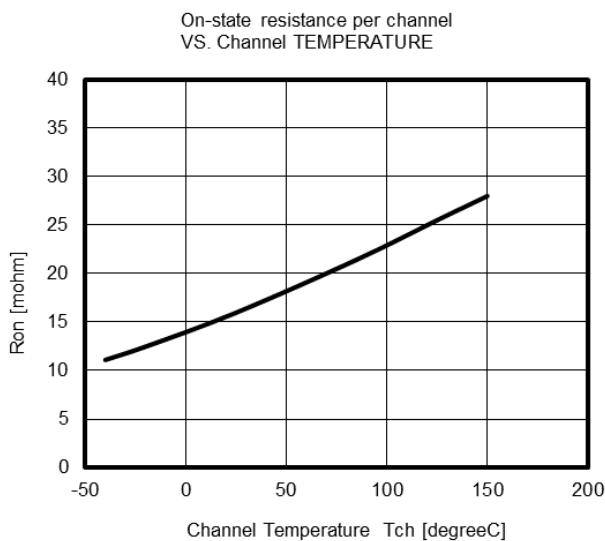
3.11 Marking information

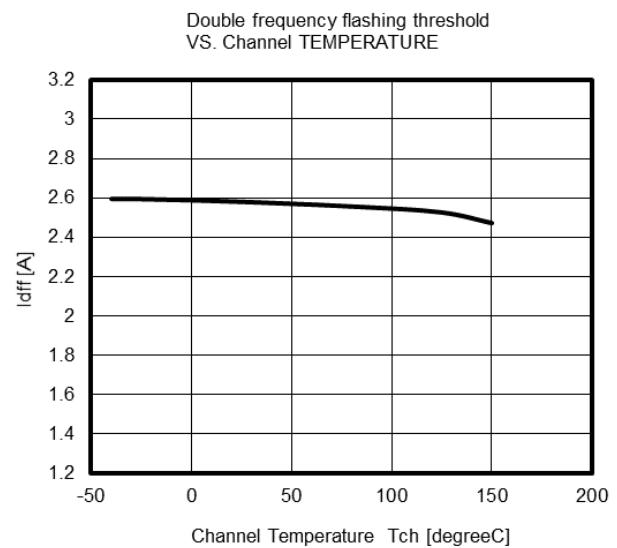
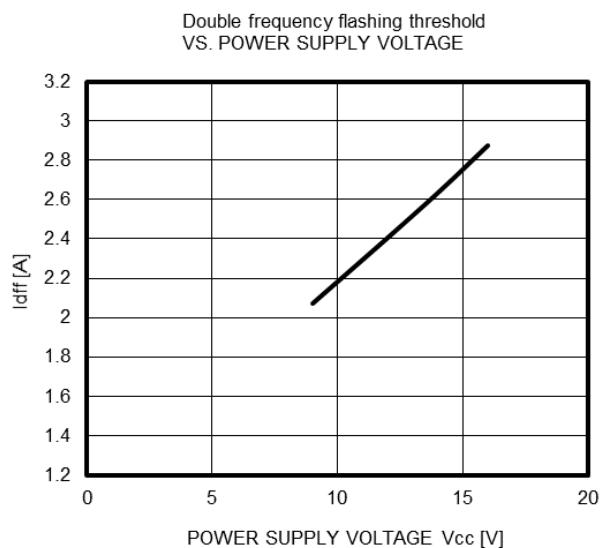
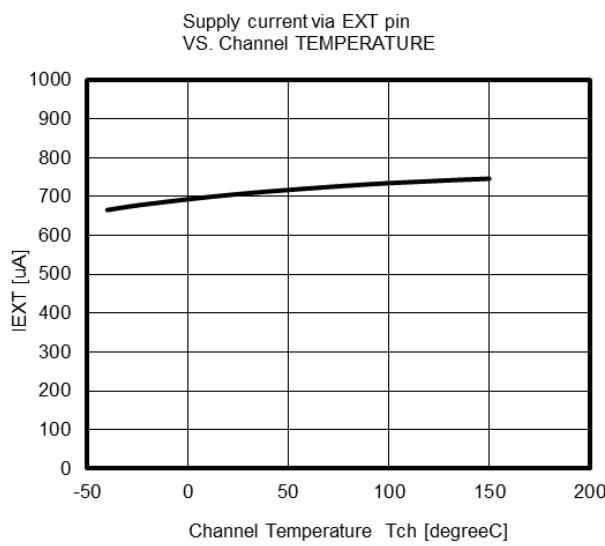
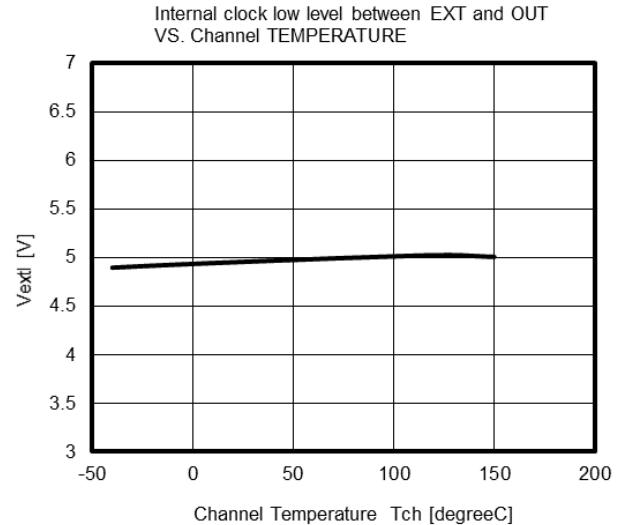
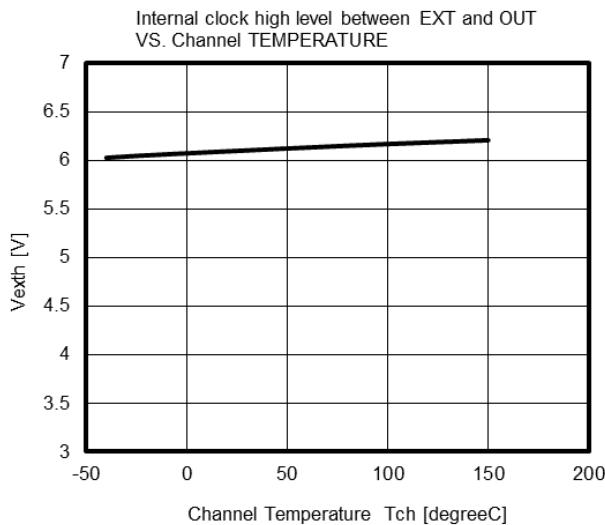


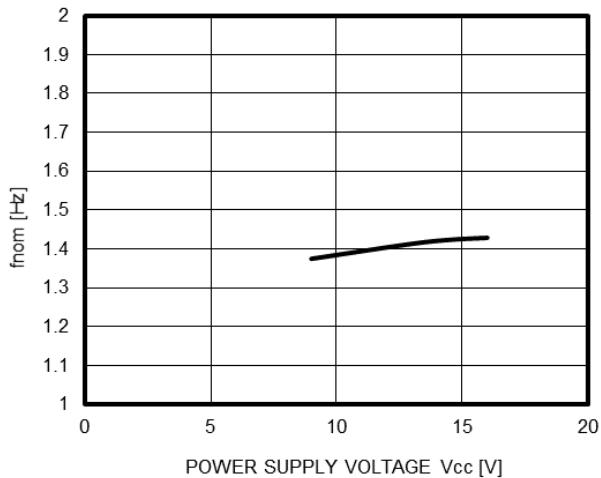
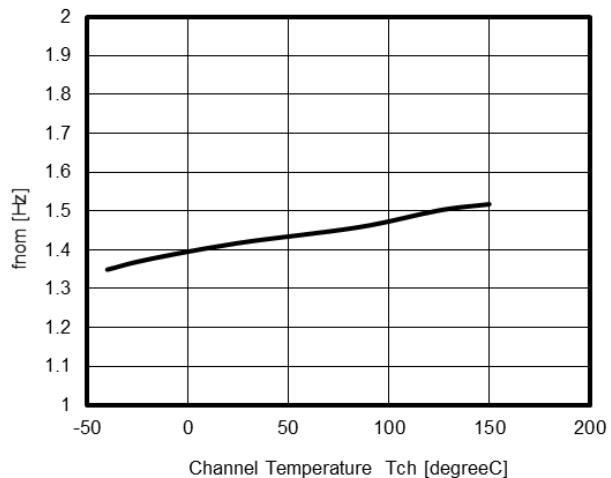
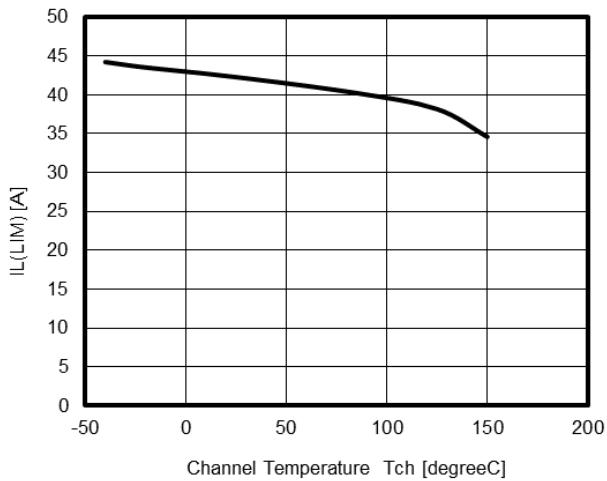
Note: *1. Composition of the lot code



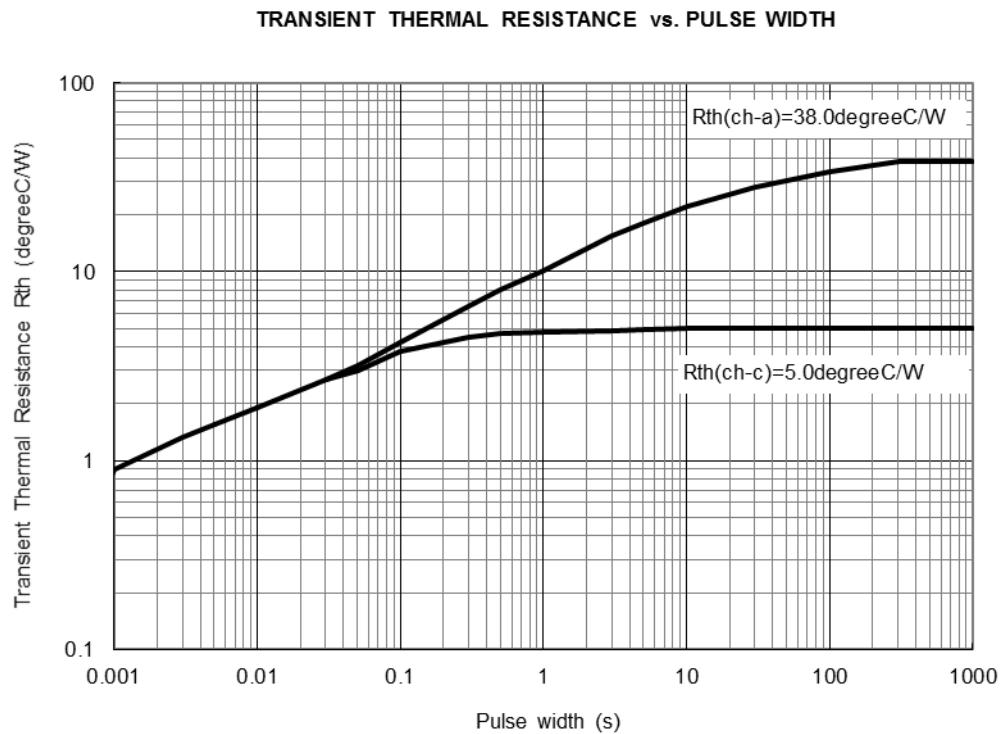
4. Typical characteristics



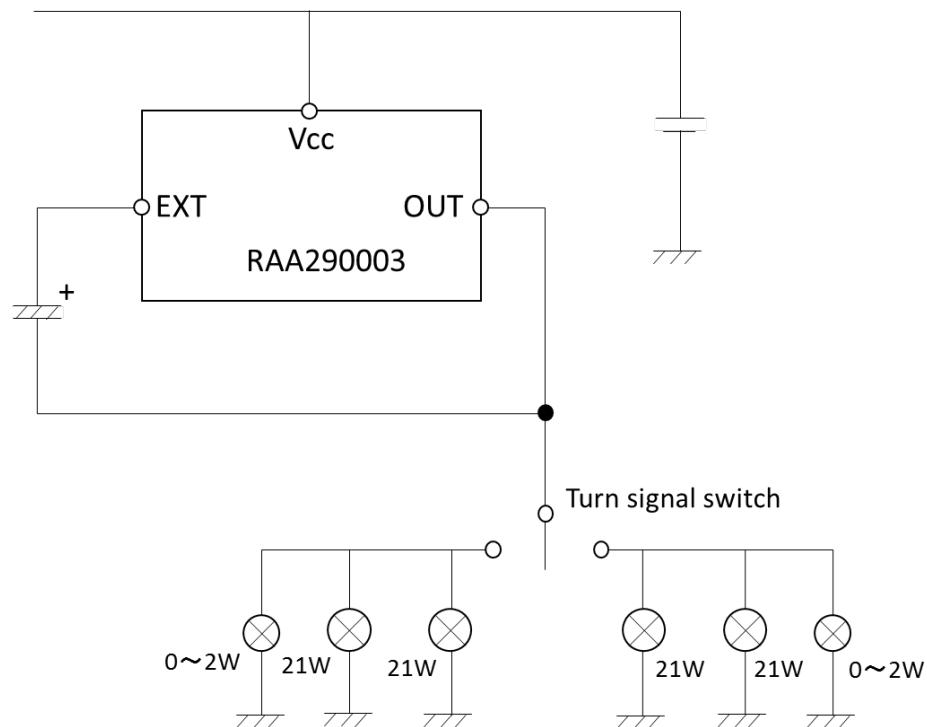


Nominal operation frequency
VS. POWER SUPPLY VOLTAGENominal operation frequency
VS. Channel TEMPERATURECurrent limitation
VS. Channel TEMPERATURE

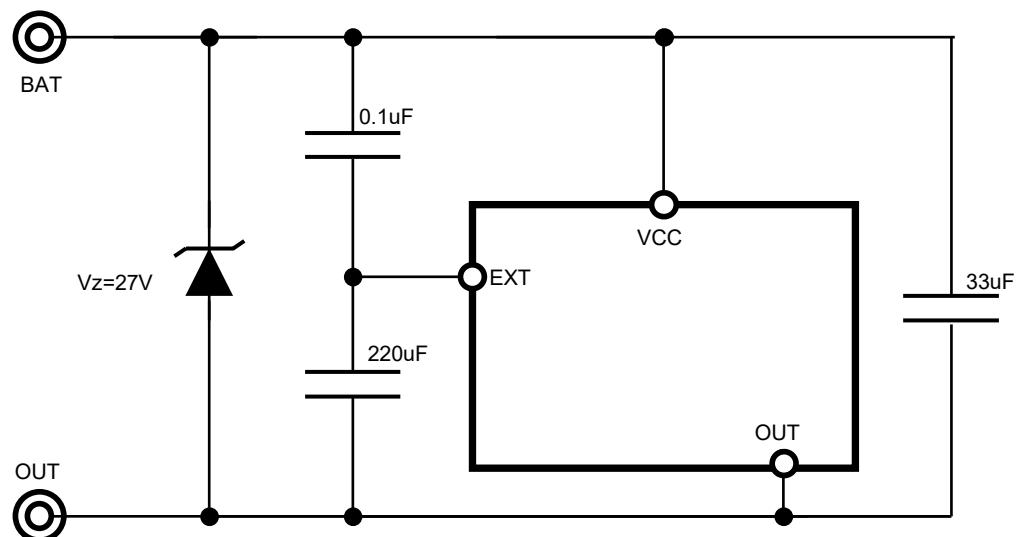
5. Thermal characteristics



6. Application example in principle



Recommended circuit for dump surge



Revision History		RAA2900034H12HPD Datasheet	
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Rev.	Date	Description	
		Page	Summary
1.00	April 18, 2016	1-17	1st issue
1.01	Sep. 20, 2017	1-17	Idff (Double frequency flashing threshold) has been changed.
1.02	Feb. 28, 2020	1	Deleted description of "AEC-Q100 qualified" Deleted description of "Note: The information contained in this document is the one that was obtained when the document was issued, and may be subject to change."

All documents should contain the following section break and paragraph as the last item. The footers of this document refer to the paragraph in order to reference the last page of the document.

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