2-CH I²C-Controlled Reference Generator

General Description

The RT9406 is a universal DAC generator which supports VID on-the-fly function with five different slew rates : Fast, Fast/2, Fast/4, Fast/8 and Fast/16. An I²C interface is built in the RT9406 to communicate with microprocessors. The reference voltage is within 1% accuracy. The RT9406 also provides pins to determine the initial voltage of Vref1 and Vref2. The RT9406 is available in the SOT-23-8 package.

Features

- **I²C Interface Compatible**
- **1% Reference Voltage Accuracy**
- **Small SOT-23-8 Package**
- **RoHS Compliant and Halogen Free**

Applications

- Notebook/Desktop Computer/Servers CPU Core Supply

Ordering Information

RT9406 □□

- Package Type
  V8 : SOT-23-8
- Lead Plating System
  G : Green (Halogen Free and Pb Free)

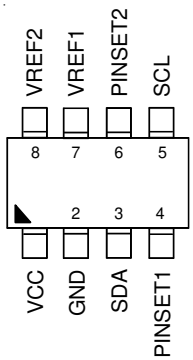
Note :

Richtek products are :

- RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
- Suitable for use in SnPb or Pb-free soldering processes.

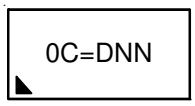
Pin Configurations

(TOP VIEW)



SOT-23-8

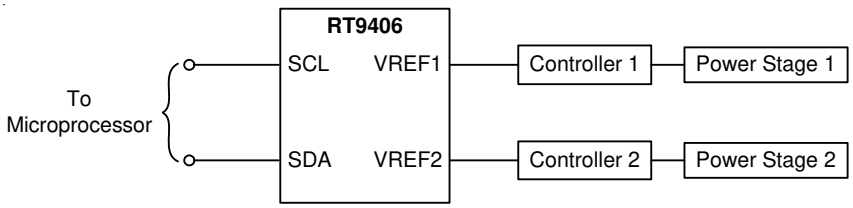
Marking Information



0C= : Product Code

DNN : Date Code

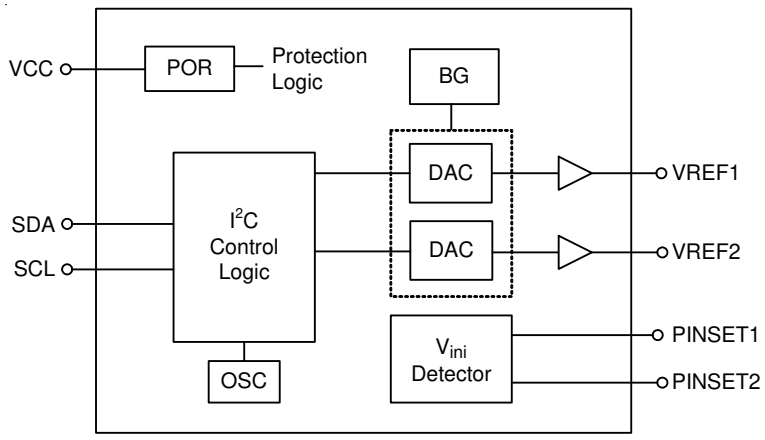
Simplified Application Circuit



Functional Pin Description

Pin No.	Pin Name	Pin Function
1	VCC	Supply Voltage Input for DAC Generator. Connect this pin to 5V and place a decoupling capacitor 2.2μF at least. The decoupling capacitor should be as close to DAC generator as possible.
2	GND	Ground for the IC.
3	SDA	DAC Generator and Microprocessor Data Transmission Interface.
4	PINSET1	Determine VREF1 Initial Voltage. Refer to Application information for details.
5	SCL	Synchronous Clock from the Microprocessor.
6	PINSET2	Determine VREF2 Initial Voltage and I^{2}C Address. Refer to Application information for details.
7	VREF1	Reference Voltage Output. The voltage can be programmed through I^{2}C bus. The reference voltage of the PWM controller can be controlled by this pin.
8	VREF2	Reference Voltage Output. The voltage can be programmed through I^{2}C bus. The reference voltage of the PWM controller can be controlled by this pin.

Function Block Diagram



Operation

I^{2}C Control Logic

The interface that receives the I^{2}C signal from microprocessor and sends the relative signals to determine VREF voltage.

DAC

Receive VID code from I^{2}C control logic to generate DAC voltage.

POR

Detect the VCC voltage and issue POR and UVLO signal.

BG

Generate reference voltage for DAC usage.

OSC

Generate clock for I^{2}C control logic.

V_{ini} Detector

Detect the initial voltage of VREF1 and VREF2.

Table 1. VR12 VID Code Table

VID7	VID6	VID5	VID4	VID3	VID2	VID1	VID0	HEX	Vref1/Vref2
0	0	0	0	0	0	0	0	00	0.1
0	0	0	0	0	0	0	1	01	0.5
0	0	0	0	0	0	1	0	02	0.51
0	0	0	0	0	0	1	1	03	0.52
0	0	0	0	0	1	0	0	04	0.53
0	0	0	0	0	1	0	1	05	0.54
0	0	0	0	0	1	1	0	06	0.55
0	0	0	0	0	1	1	1	07	0.56
0	0	0	0	1	0	0	0	08	0.57
0	0	0	0	1	0	0	1	09	0.58
0	0	0	0	1	0	1	0	0A	0.59
0	0	0	0	1	0	1	1	0B	0.6
0	0	0	0	1	1	0	0	0C	0.61
0	0	0	0	1	1	0	1	0D	0.62
0	0	0	0	1	1	1	0	0E	0.63
0	0	0	0	1	1	1	1	0F	0.64
0	0	0	1	0	0	0	0	10	0.65
0	0	0	1	0	0	0	1	11	0.66
0	0	0	1	0	0	1	0	12	0.67
0	0	0	1	0	0	1	1	13	0.68
0	0	0	1	0	1	0	0	14	0.69
0	0	0	1	0	1	0	1	15	0.7
0	0	0	1	0	1	1	0	16	0.71
0	0	0	1	0	1	1	1	17	0.72
0	0	0	1	1	0	0	0	18	0.73
0	0	0	1	1	0	0	1	19	0.74
0	0	0	1	1	0	1	0	1A	0.75
0	0	0	1	1	0	1	1	1B	0.76
0	0	0	1	1	1	0	0	1C	0.77
0	0	0	1	1	1	0	1	1D	0.78
0	0	0	1	1	1	1	0	1E	0.79
0	0	0	1	1	1	1	1	1F	0.8
0	0	1	0	0	0	0	0	20	0.81
0	0	1	0	0	0	0	1	21	0.82
0	0	1	0	0	0	1	0	22	0.83
0	0	1	0	0	0	1	1	23	0.84
0	0	1	0	0	1	0	0	24	0.85
0	0	1	0	0	1	0	1	25	0.86
0	0	1	0	0	1	1	0	26	0.87

VID7	VID6	VID5	VID4	VID3	VID2	VID1	VID0	HEX	Vref1/Vref2
0	0	1	0	0	1	1	1	27	0.88
0	0	1	0	1	0	0	0	28	0.89
0	0	1	0	1	0	0	1	29	0.9
0	0	1	0	1	0	1	0	2A	0.91
0	0	1	0	1	0	1	1	2B	0.92
0	0	1	0	1	1	0	0	2C	0.93
0	0	1	0	1	1	0	1	2D	0.94
0	0	1	0	1	1	1	0	2E	0.95
0	0	1	0	1	1	1	1	2F	0.96
0	0	1	1	0	0	0	0	30	0.97
0	0	1	1	0	0	0	1	31	0.98
0	0	1	1	0	0	1	0	32	0.99
0	0	1	1	0	0	1	1	33	1
0	0	1	1	0	1	0	0	34	1.01
0	0	1	1	0	1	0	1	35	1.02
0	0	1	1	0	1	1	0	36	1.03
0	0	1	1	0	1	1	1	37	1.04
0	0	1	1	1	0	0	0	38	1.05
0	0	1	1	1	0	0	1	39	1.06
0	0	1	1	1	0	1	0	3A	1.07
0	0	1	1	1	0	1	1	3B	1.08
0	0	1	1	1	1	0	0	3C	1.09
0	0	1	1	1	1	0	1	3D	1.1
0	0	1	1	1	1	1	0	3E	1.11
0	0	1	1	1	1	1	1	3F	1.12
0	1	0	0	0	0	0	0	40	1.13
0	1	0	0	0	0	0	1	41	1.14
0	1	0	0	0	0	1	0	42	1.15
0	1	0	0	0	0	1	1	43	1.16
0	1	0	0	0	1	0	0	44	1.17
0	1	0	0	0	1	0	1	45	1.18
0	1	0	0	0	1	1	0	46	1.19
0	1	0	0	0	1	1	1	47	1.2
0	1	0	0	1	0	0	0	48	1.21
0	1	0	0	1	0	0	1	49	1.22
0	1	0	0	1	0	1	0	4A	1.23
0	1	0	0	1	0	1	1	4B	1.24
0	1	0	0	1	1	0	0	4C	1.25
0	1	0	0	1	1	0	1	4D	1.26
0	1	0	0	1	1	1	0	4E	1.27

VID7	VID6	VID5	VID4	VID3	VID2	VID1	VID0	HEX	Vref1/Vref2
0	1	0	0	1	1	1	1	4F	1.28
0	1	0	1	0	0	0	0	50	1.29
0	1	0	1	0	0	0	1	51	1.3
0	1	0	1	0	0	1	0	52	1.31
0	1	0	1	0	0	1	1	53	1.32
0	1	0	1	0	1	0	0	54	1.33
0	1	0	1	0	1	0	1	55	1.34
0	1	0	1	0	1	1	0	56	1.35
0	1	0	1	0	1	1	1	57	1.36
0	1	0	1	1	0	0	0	58	1.37
0	1	0	1	1	0	0	1	59	1.38
0	1	0	1	1	0	1	0	5A	1.39
0	1	0	1	1	0	1	1	5B	1.4
0	1	0	1	1	1	0	0	5C	1.41
0	1	0	1	1	1	0	1	5D	1.42
0	1	0	1	1	1	1	0	5E	1.43
0	1	0	1	1	1	1	1	5F	1.44
0	1	1	0	0	0	0	0	60	1.45
0	1	1	0	0	0	0	1	61	1.46
0	1	1	0	0	0	1	0	62	1.47
0	1	1	0	0	0	1	1	63	1.48
0	1	1	0	0	1	0	0	64	1.49
0	1	1	0	0	1	0	1	65	1.5
0	1	1	0	0	1	1	0	66	1.51
0	1	1	0	0	1	1	1	67	1.52
0	1	1	0	1	0	0	0	68	1.53
0	1	1	0	1	0	0	1	69	1.54
0	1	1	0	1	0	1	0	6A	1.55
0	1	1	0	1	0	1	1	6B	1.56
0	1	1	0	1	1	0	0	6C	1.57
0	1	1	0	1	1	0	1	6D	1.58
0	1	1	0	1	1	1	0	6E	1.59
0	1	1	0	1	1	1	1	6F	1.6
0	1	1	1	0	0	0	0	70	1.61
0	1	1	1	0	0	0	1	71	1.62
0	1	1	1	0	0	1	0	72	1.63
0	1	1	1	0	0	1	1	73	1.64
0	1	1	1	0	1	0	0	74	1.65
0	1	1	1	0	1	0	1	75	1.66
0	1	1	1	0	1	1	0	76	1.67

VID7	VID6	VID5	VID4	VID3	VID2	VID1	VID0	HEX	Vref1/Vref2
0	1	1	1	0	1	1	1	77	1.68
0	1	1	1	1	0	0	0	78	1.69
0	1	1	1	1	0	0	1	79	1.7
0	1	1	1	1	0	1	0	7A	1.71
0	1	1	1	1	0	1	1	7B	1.72
0	1	1	1	1	1	0	0	7C	1.73
0	1	1	1	1	1	0	1	7D	1.74
0	1	1	1	1	1	1	0	7E	1.75
0	1	1	1	1	1	1	1	7F	1.76
1	0	0	0	0	0	0	0	80	1.77
1	0	0	0	0	0	0	1	81	1.78
1	0	0	0	0	0	1	0	82	1.79
1	0	0	0	0	0	1	1	83	1.8
1	0	0	0	0	1	0	0	84	1.81
1	0	0	0	0	1	0	1	85	1.82
1	0	0	0	0	1	1	0	86	1.83
1	0	0	0	0	1	1	1	87	1.84
1	0	0	0	1	0	0	0	88	1.85
1	0	0	0	1	0	0	1	89	1.86
1	0	0	0	1	0	1	0	8A	1.87
1	0	0	0	1	0	1	1	8B	1.88
1	0	0	0	1	1	0	0	8C	1.89
1	0	0	0	1	1	0	1	8D	1.9
1	0	0	0	1	1	1	0	8E	1.91
1	0	0	0	1	1	1	1	8F	1.92
1	0	0	1	0	0	0	0	90	1.93
1	0	0	1	0	0	0	1	91	1.94
1	0	0	1	0	0	1	0	92	1.95
1	0	0	1	0	0	1	1	93	1.96
1	0	0	1	0	1	0	0	94	1.97
1	0	0	1	0	1	0	1	95	1.98
1	0	0	1	0	1	1	0	96	1.99
1	0	0	1	0	1	1	1	97	2
1	0	0	1	1	0	0	0	98	2.01
1	0	0	1	1	0	0	1	99	2.02
1	0	0	1	1	0	1	0	9A	2.03
1	0	0	1	1	0	1	1	9B	2.04
1	0	0	1	1	1	0	0	9C	2.05
1	0	0	1	1	1	0	1	9D	2.06
1	0	0	1	1	1	1	0	9E	2.07

VID7	VID6	VID5	VID4	VID3	VID2	VID1	VID0	HEX	Vref1/Vref2
1	0	0	1	1	1	1	1	9F	2.08
1	0	1	0	0	0	0	0	A0	2.09
1	0	1	0	0	0	0	1	A1	2.1
1	0	1	0	0	0	1	0	A2	2.11
1	0	1	0	0	0	1	1	A3	2.12
1	0	1	0	0	1	0	0	A4	2.13
1	0	1	0	0	1	0	1	A5	2.14
1	0	1	0	0	1	1	0	A6	2.15
1	0	1	0	0	1	1	1	A7	2.16
1	0	1	0	1	0	0	0	A8	2.17
1	0	1	0	1	0	0	1	A9	2.18
1	0	1	0	1	0	1	0	AA	2.19
1	0	1	0	1	0	1	1	AB	2.2
1	0	1	0	1	1	0	0	AC	2.21
1	0	1	0	1	1	0	1	AD	2.22
1	0	1	0	1	1	1	0	AE	2.23
1	0	1	0	1	1	1	1	AF	2.24
1	0	1	1	0	0	0	0	B0	2.25
1	0	1	1	0	0	0	1	B1	2.26
1	0	1	1	0	0	1	0	B2	2.27
1	0	1	1	0	0	1	1	B3	2.28
1	0	1	1	0	1	0	0	B4	2.29
1	0	1	1	0	1	0	1	B5	2.3
1	0	1	1	0	1	1	0	B6	2.31
1	0	1	1	0	1	1	1	B7	2.32
1	0	1	1	1	0	0	0	B8	2.33
1	0	1	1	1	0	0	1	B9	2.34
1	0	1	1	1	0	1	0	BA	2.35
1	0	1	1	1	0	1	1	BB	2.36
1	0	1	1	1	1	0	0	BC	2.37
1	0	1	1	1	1	0	1	BD	2.38
1	0	1	1	1	1	1	0	BE	2.39
1	0	1	1	1	1	1	1	BF	2.4
1	1	0	0	0	0	0	0	C0	2.41
1	1	0	0	0	0	0	1	C1	2.42
1	1	0	0	0	0	1	0	C2	2.43
1	1	0	0	0	0	1	1	C3	2.44
1	1	0	0	0	1	0	0	C4	2.45
1	1	0	0	0	1	0	1	C5	2.46
1	1	0	0	0	1	1	0	C6	2.47

VID7	VID6	VID5	VID4	VID3	VID2	VID1	VID0	HEX	Vref1/Vref2
1	1	0	0	0	1	1	1	C7	2.48
1	1	0	0	1	0	0	0	C8	2.49
1	1	0	0	1	0	0	1	C9	2.5
1	1	0	0	1	0	1	0	CA	2.51
1	1	0	0	1	0	1	1	CB	2.52
1	1	0	0	1	1	0	0	CC	2.53
1	1	0	0	1	1	0	1	CD	2.54
1	1	0	0	1	1	1	0	CE	2.55
1	1	0	0	1	1	1	1	CF	2.56
1	1	0	1	0	0	0	0	D0	2.57
1	1	0	1	0	0	0	1	D1	2.58
1	1	0	1	0	0	1	0	D2	2.59
1	1	0	1	0	0	1	1	D3	2.6
1	1	0	1	0	1	0	0	D4	2.61
1	1	0	1	0	1	0	1	D5	2.62
1	1	0	1	0	1	1	0	D6	2.63
1	1	0	1	0	1	1	1	D7	2.64
1	1	0	1	1	0	0	0	D8	2.65
1	1	0	1	1	0	0	1	D9	2.66
1	1	0	1	1	0	1	0	DA	2.67
1	1	0	1	1	0	1	1	DB	2.68
1	1	0	1	1	1	0	0	DC	2.69
1	1	0	1	1	1	0	1	DD	2.7
1	1	0	1	1	1	1	0	DE	2.71
1	1	0	1	1	1	1	1	DF	2.72
1	1	1	0	0	0	0	0	E0	2.73
1	1	1	0	0	0	0	1	E1	2.74
1	1	1	0	0	0	1	0	E2	2.75
1	1	1	0	0	0	1	1	E3	2.76
1	1	1	0	0	1	0	0	E4	2.77
1	1	1	0	0	1	0	1	E5	2.78
1	1	1	0	0	1	1	0	E6	2.79
1	1	1	0	0	1	1	1	E7	2.8
1	1	1	0	1	0	0	0	E8	2.81
1	1	1	0	1	0	0	1	E9	2.82
1	1	1	0	1	0	1	0	EA	2.83
1	1	1	0	1	0	1	1	EB	2.84
1	1	1	0	1	1	0	0	EC	2.85
1	1	1	0	1	1	0	1	ED	2.86
1	1	1	0	1	1	1	0	EE	2.87

VID7	VID6	VID5	VID4	VID3	VID2	VID1	VID0	HEX	Vref1/Vref2
1	1	1	0	1	1	1	1	EF	2.88
1	1	1	1	0	0	0	0	F0	2.89
1	1	1	1	0	0	0	1	F1	2.9
1	1	1	1	0	0	1	0	F2	2.91
1	1	1	1	0	0	1	1	F3	2.92
1	1	1	1	0	1	0	0	F4	2.93
1	1	1	1	0	1	0	1	F5	2.94
1	1	1	1	0	1	1	0	F6	2.95
1	1	1	1	0	1	1	1	F7	2.96
1	1	1	1	1	0	0	0	F8	2.97
1	1	1	1	1	0	0	1	F9	2.98
1	1	1	1	1	0	1	0	FA	2.99
1	1	1	1	1	0	1	1	FB	3
1	1	1	1	1	1	0	0	FC	3.01
1	1	1	1	1	1	0	1	FD	3.02
1	1	1	1	1	1	1	0	FE	3.03
1	1	1	1	1	1	1	1	FF	3.04

Absolute Maximum Ratings (Note 1)

- VCC to GND ---------- –0.3V to 6.8V
- PINSET1, PINSET2, SCL, SDA, VREF1, VREF2 to GND ---------- –0.3V to 6.8V
- Power Dissipation, P_D @ T_A = 25°C
  SOT-23-8 ---------- 0.53W
- Package Thermal Resistance (Note 2)
  SOT-23-8, θ_{JA} ---------- 186.2°C/W
- Junction Temperature ---------- 150°C
- Lead Temperature (Soldering, 10 sec.) ---------- 260°C
- Storage Temperature Range ---------- –65°C to 150°C
- ESD Susceptibility (Note 3)
  HBM (Human Body Model) ---------- 2kV

Recommended Operating Conditions (Note 4)

- Supply Voltage, VCC ---------- 4.5V to 5.5V
- Junction Temperature Range ---------- –40°C to 125°C
- Ambient Temperature Range ---------- –40°C to 85°C

Electrical Characteristics

(V_{CC} = 5V, T_A = 25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Input							
Supply Voltage		V_{CC}		4.5	5	5.5	V
Supply Current		I_{CC}	After Start-up	--	2	--	mA
Supply Current before POR		I_{POR}	V_{CC} = 2.1V	--	1.4	--	mA
Reference and DAC							
Reference Voltage Accuracy		V_{REF}	V_{DAC1} > 1.12V	–1	0	1	%/VID
			V_{DAC} = 0.35V to 1.12V	–10	0	10	mV
Line Regulation		ΔV_{LINE}	REFx = no load, 4.5V < V_{CC} < 5.5V, V_{REF} = 1.12V	–10	--	12	mV
Load Regulation		ΔV_{LOAD}	V_{REFx} = 1.12V, 0A < I_{REFx} < 0.5mA	–10	--	10	mV
Slew Rate							
Dynamic VID Fast Slew Rate		SR	Set VID fast	10	11.5	13	mV/μs
Serial VID							
SCL and SDA Input Voltage	Logic-High	V_{IH}	Respect to INTEL Spec. with 50mV hysteresis	2.4	--	--	V
	Logic-Low	V_{IL}		--	--	0.8	
Leakage Current of SCL, SDA		I_{LEAK}		–1	--	3	μA
Output Low Voltage at SDA			I_{SDA} = 10mA	--	--	0.3	V

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection						
Under Voltage Lockout Threshold	V_{UVLO}		3.9	4	4.1	V
Under Voltage Lockout Hysteresis	ΔV_{UVLO}		100	150	200	mV

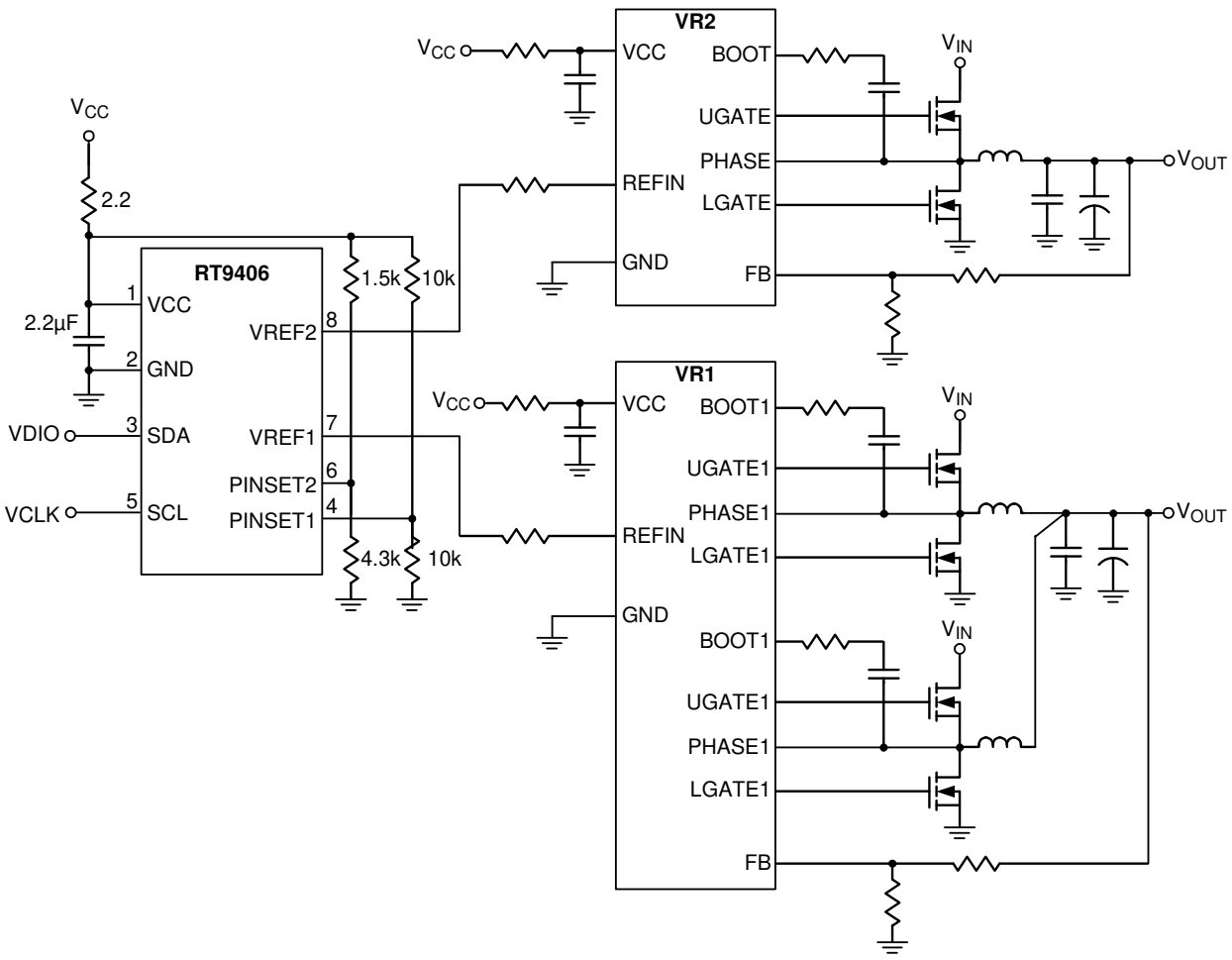
Note 1. Stresses beyond those listed "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions may affect device reliability.

Note 2. θ_{JA} is measured at T_A = 25°C on a high effective thermal conductivity four-layer test board per JEDEC 51-7.

Note 3. Devices are ESD sensitive. Handling precaution is recommended.

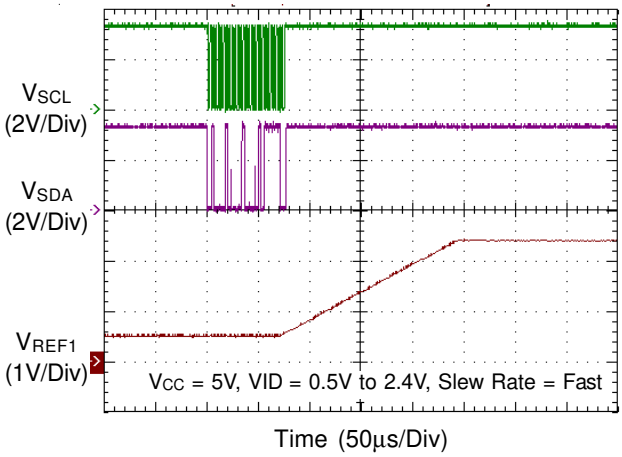
Note 4. The device is not guaranteed to function outside its operating conditions.

Typical Application Circuit



Typical Operating Characteristics

VREF1 Dynamic VID Up



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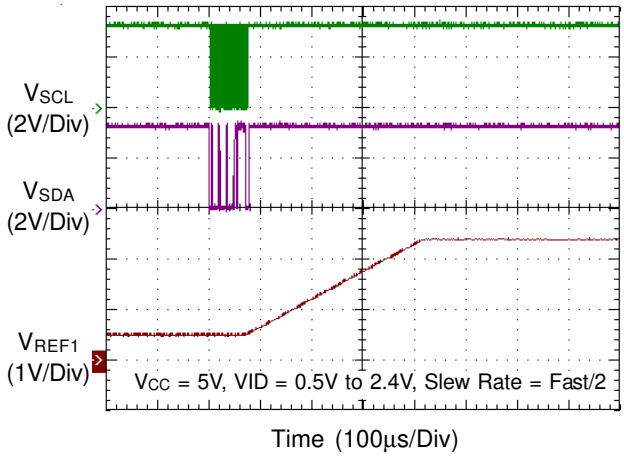

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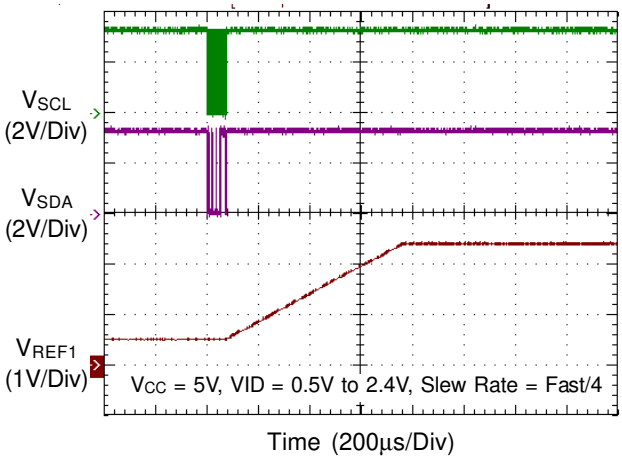

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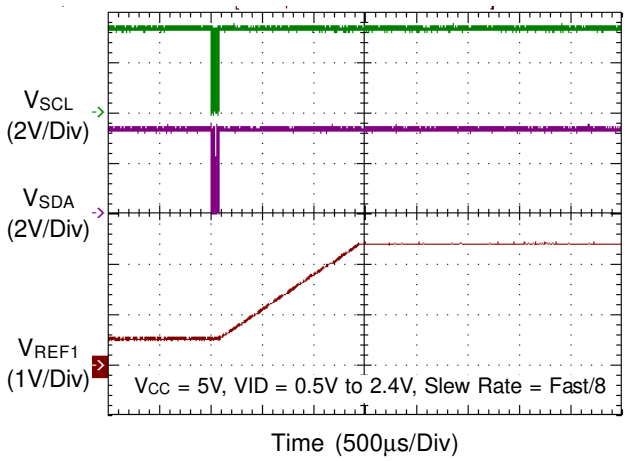

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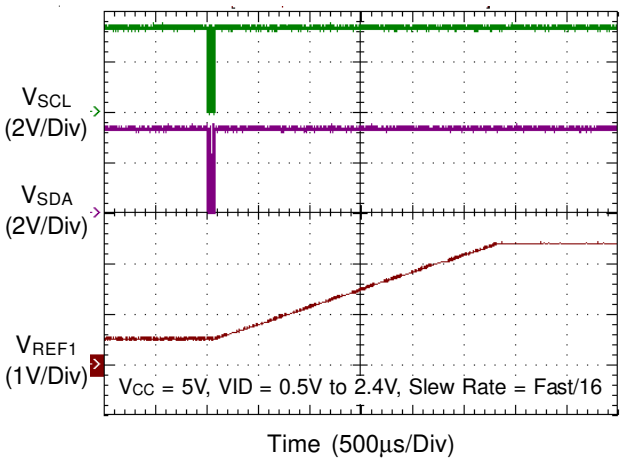
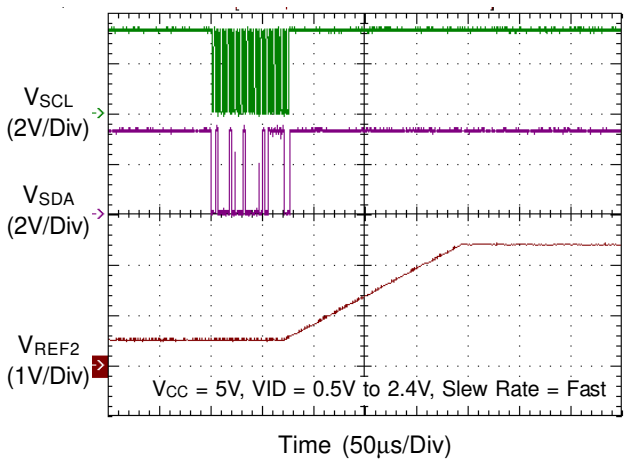


VREF2 Dynamic VID Up



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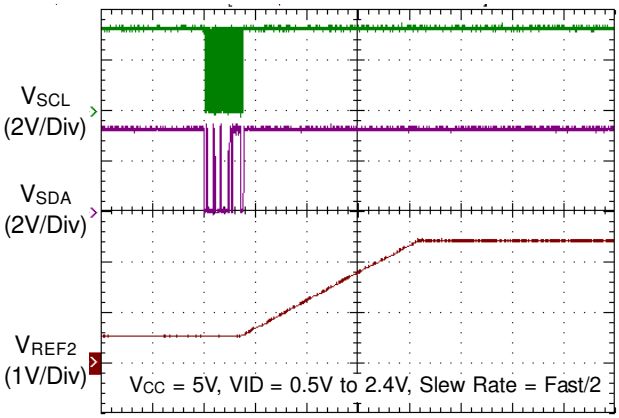

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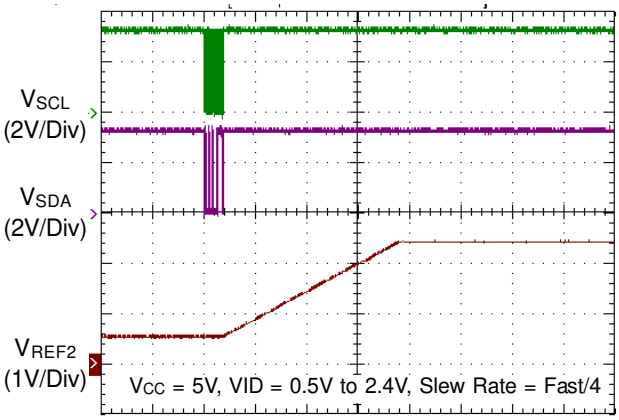

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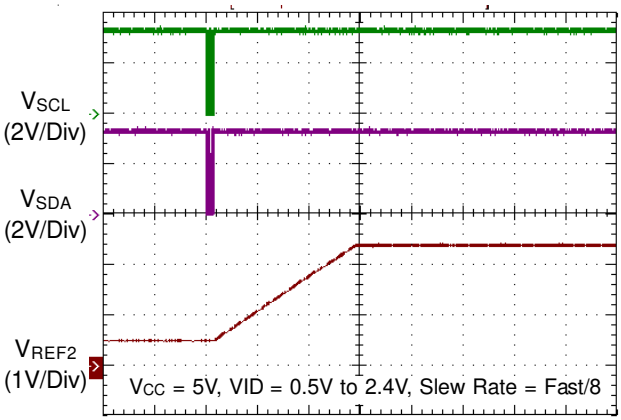

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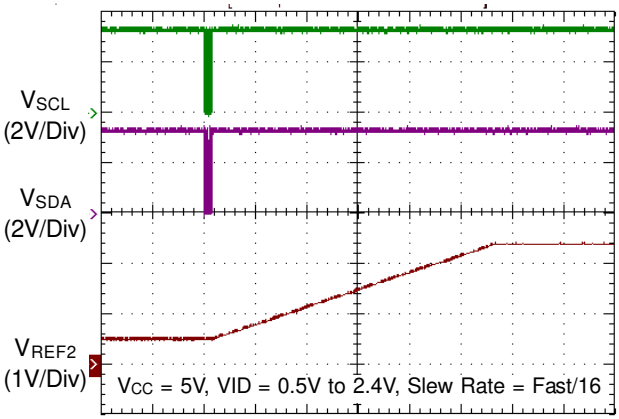


Application information

The RT9406 is a universal DAC generator that supports VID on-the-fly function with five different slew rates : Fast Fast, Fast/2, Fast/4, Fast/8 and Fast/16. An I²C interface is built in the R9406 to communicate with microprocessor.

I²C Interface

The RT9406 adopts I²C interface for VREF control. I²C is a two wire (SCL, SDA) serial synchronous interface used to transfer power management information. The clock signal is provided from and synchronized with the microprocessor, and the microprocessor drives the SCL signal with a low-voltage open-drain driver. The master may shut down the SCL signal to save power when no data transfer is needed. SDA is a low-voltage, open-drain data signal that master and slaves use to transfer information to each other. The operation frequency can be up to 1MHz.

Initial Vref Setting

The RT9406 supports the PINSET1 and PINSET2 pins to determine the initial voltage of VREF1 and VREF2 pins. The Vini detector keeps detecting the PINSETx voltage after V_{CC} slewing through POR threshold. And the initial VREFx voltage begins to track Vini detector voltage with fast/4 slew rate after V_{CC} slewing through UVLO threshold.

Vref and Slew Rate Control Register

The voltage of VREF1 and VREF2 pins is controlled by I²C interface. The Vref1 register address is 0x10 and the Vref2 register address is 0x20. Besides, the slew rate of Vref1 and Vref2 is changed by 0x12 and 0x22, individually. The Table 2 shows the register data definition.

Table 2. Register Data Definition

Register Data	Note
0x0	1/2 Fast SR
0x1	1/4 Fast SR
0x2	1/8 Fast SR
0x3	1/16 Fast SR
0x4	Fast SR

Chip Input and Enable

The RT9406 operates with a well regulated supply input at VCC pin. A minimum 2.2μF ceramic capacitor physically near the VCC pin is required for locally bypassing the supply noise.

Under-Voltage Lockout (UVLO)

During normal operation, if the voltage at the VCC pin drops below UVLO threshold 3.9V (min), the RT9406 will trigger UVLO and force all function off.

I²C Address Selection

The RT9406 support the I²C address selection through adjusting the PINSET2 Voltage. The PINSET2 voltage detection for I²C address selection has two conditions. One is PINSET2 voltage is get at V_{CC} slewing to UVLO threshold when V_{CC} slews from POR threshold to UVLO threshold is larger than 110μs. The other is PINSET2 voltage is obtained at V_{CC} going through POR threshold with 110μs delay when V_{CC} slews from POR threshold to UVLO threshold is less than 110μs. There are three comparators compare PINSET2 voltage to determine I²C address. Table 3 shows the I²C address including the write bit in address and Table 4 shows the other way to describe I²C address without the write bit.

Table 3. I²C Address Including the Write Bit in Address

PINSET2 Voltage	I²C Address
$V_{PINSET2} < 2$	0x40
$2 \le V_{PINSET2} < 2.5$	0x42
$2.5 \le V_{PINSET2} < 3$	0x44
$3 \le V_{PINSET2}$	0x46

Table 4. I²C Address Without the Write Bit in Address

PINSET2 Voltage	I²C Address
$V_{PINSET2} < 2$	0x20
$2 \le V_{PINSET2} < 2.5$	0x21
$2.5 \le V_{PINSET2} < 3$	0x22
$3 \le V_{PINSET2}$	0x23

Thermal Considerations

For continuous operation, do not exceed absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated by the following formula :

$P_{D(MAX)} = (T_{J(MAX)} - T_A) / \theta_{JA}$

where $T_{J(MAX)}$ is the maximum junction temperature, T_A is the ambient temperature, and θ_{JA} is the junction to ambient thermal resistance.

For recommended operating condition specifications, the maximum junction temperature is 125°C. The junction to ambient thermal resistance, θ_{JA}, is layout dependent. For SOT-23-8 package, the thermal resistance, θ_{JA}, is 186.2°C/W on a standard JEDEC 51-7 four-layer thermal test board. The maximum power dissipation at T_A = 25°C can be calculated by the following formula :

$P_{D(MAX)}$ = (125°C − 25°C) / (186.2°C/W) = 0.53W for SOT-23-8 package

The maximum power dissipation depends on the operating ambient temperature for fixed $T_{J(MAX)}$ and thermal resistance, θ_{JA}. The derating curve in Figure 1 allows the designer to see the effect of rising ambient temperature on the maximum power dissipation.

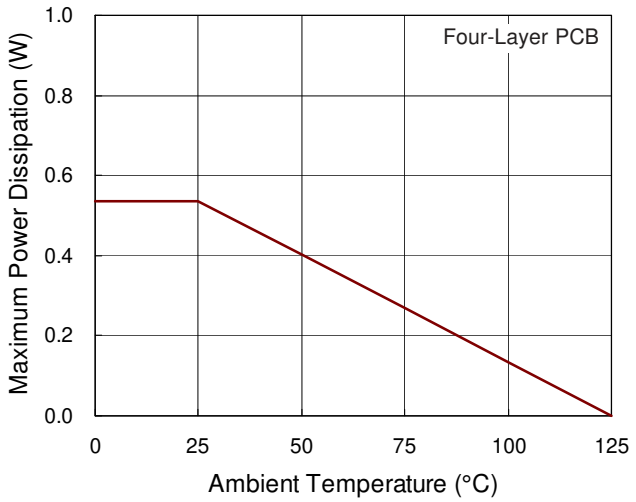
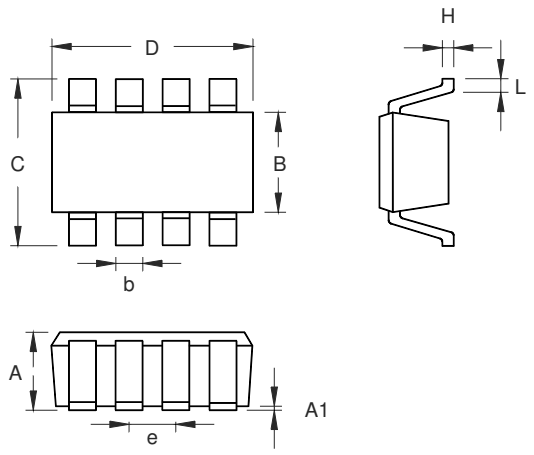


Figure 1. Derating Curve of Maximum Power Dissipation

Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.000	1.450	0.039	0.057
A1	0.000	0.150	0.000	0.006
B	1.500	1.700	0.059	0.067
b	0.220	0.500	0.009	0.020
C	2.600	3.000	0.102	0.118
D	2.800	3.000	0.110	0.118
e	0.585	0.715	0.023	0.028
H	0.100	0.220	0.004	0.009
L	0.300	0.600	0.012	0.024

SOT-23-8 Surface Mount Package

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