Ordering number : ENN6151

Monolithic Linear IC

LA5627W

Four-Channel Switching Regulator Controller

Overview

The LA5627W is a 4-channel switching regulator controller IC.

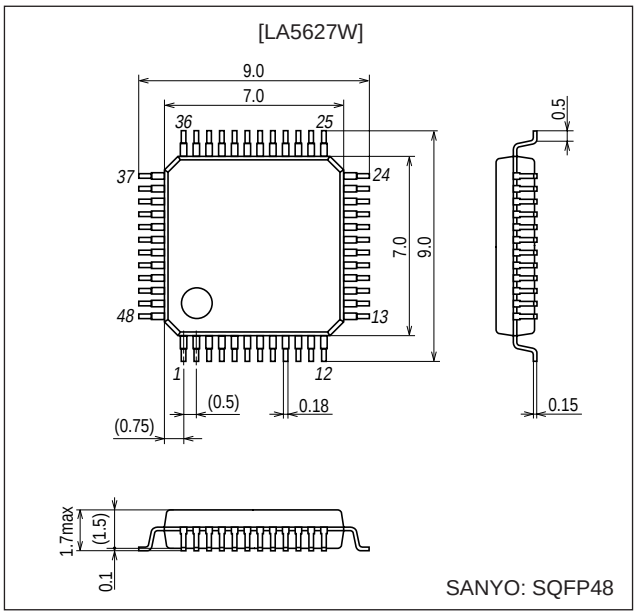
Functions and Features

- Supports low-voltage operation with a minimum operating voltage of 1.8 V (when the internal sub-power supply is not used).
- Operates from voltages as low as 1.2 V when the internal sub-power supply is used.
- Independent standby circuits in each of the four channels

Package Dimensions

unit: mm

3163B-SQFP48



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage 1	V_{CC} max		14	V
Maximum supply voltage 2	V_{BATT} max		14	V
Allowable power dissipation	Pd max	Independent IC	0.45	W
Operating temperature	Topr		–20 to +85	°C
Storage temperature	Tstg		–55 to +150	°C

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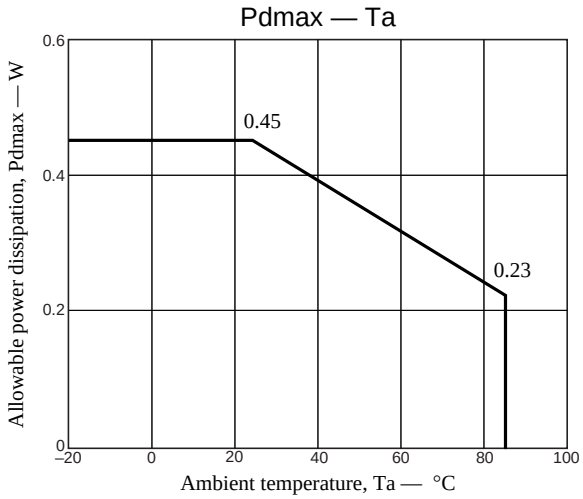
Operating Conditions at Ta = 25°C

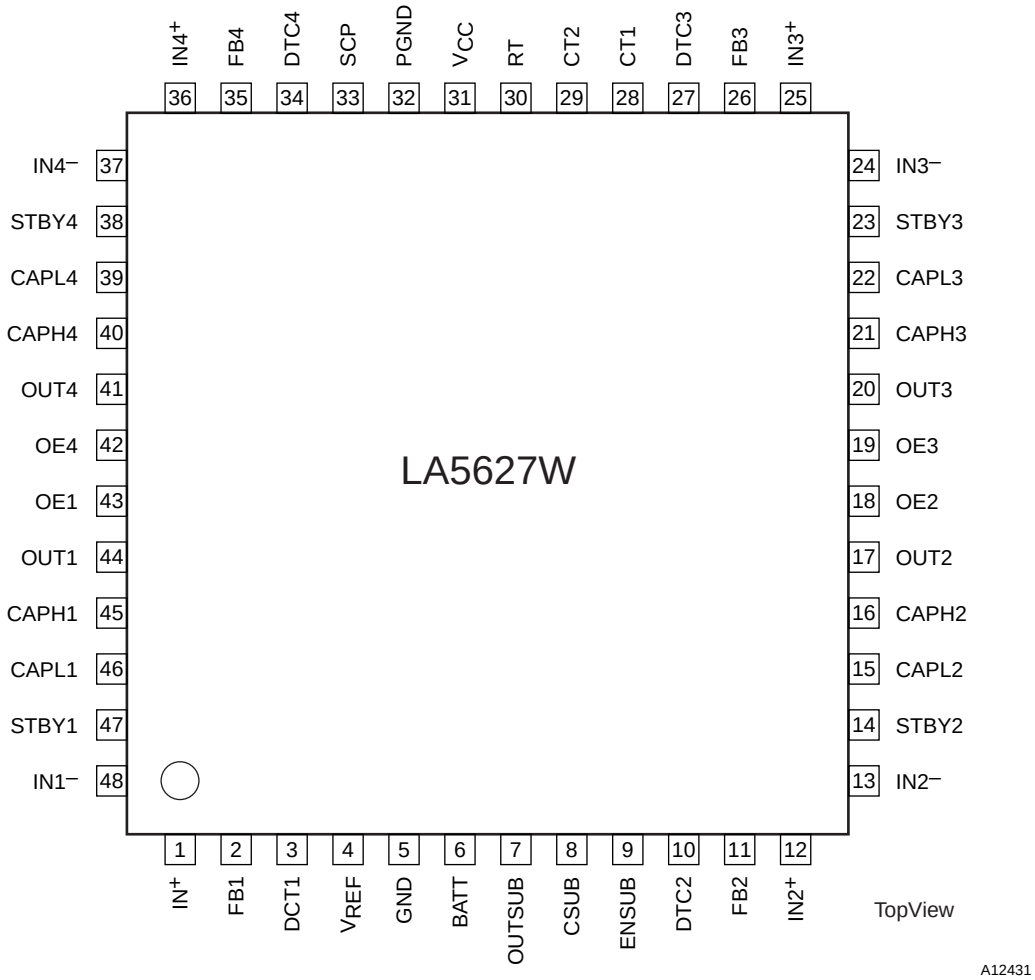
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage 1	V_{CC}		1.8 to 11	V
Supply voltage 2	V_{BATT}		1.2 to 11	V
Output sink current	ISINK max		0 to 30	mA
Reference voltage output current	I_{REF}		0 to 1	mA
Timing resistor value	RT		3 to 30	kΩ
Timing capacitor value	CT		100 to 1000	pF
Triangle wave frequency	f_{OSC}		0.1 to 1	MHz

Electrical Characteristics at Ta = 25°C, V_{CC} = 3 V, VSTBY1 to 4 = 3 V

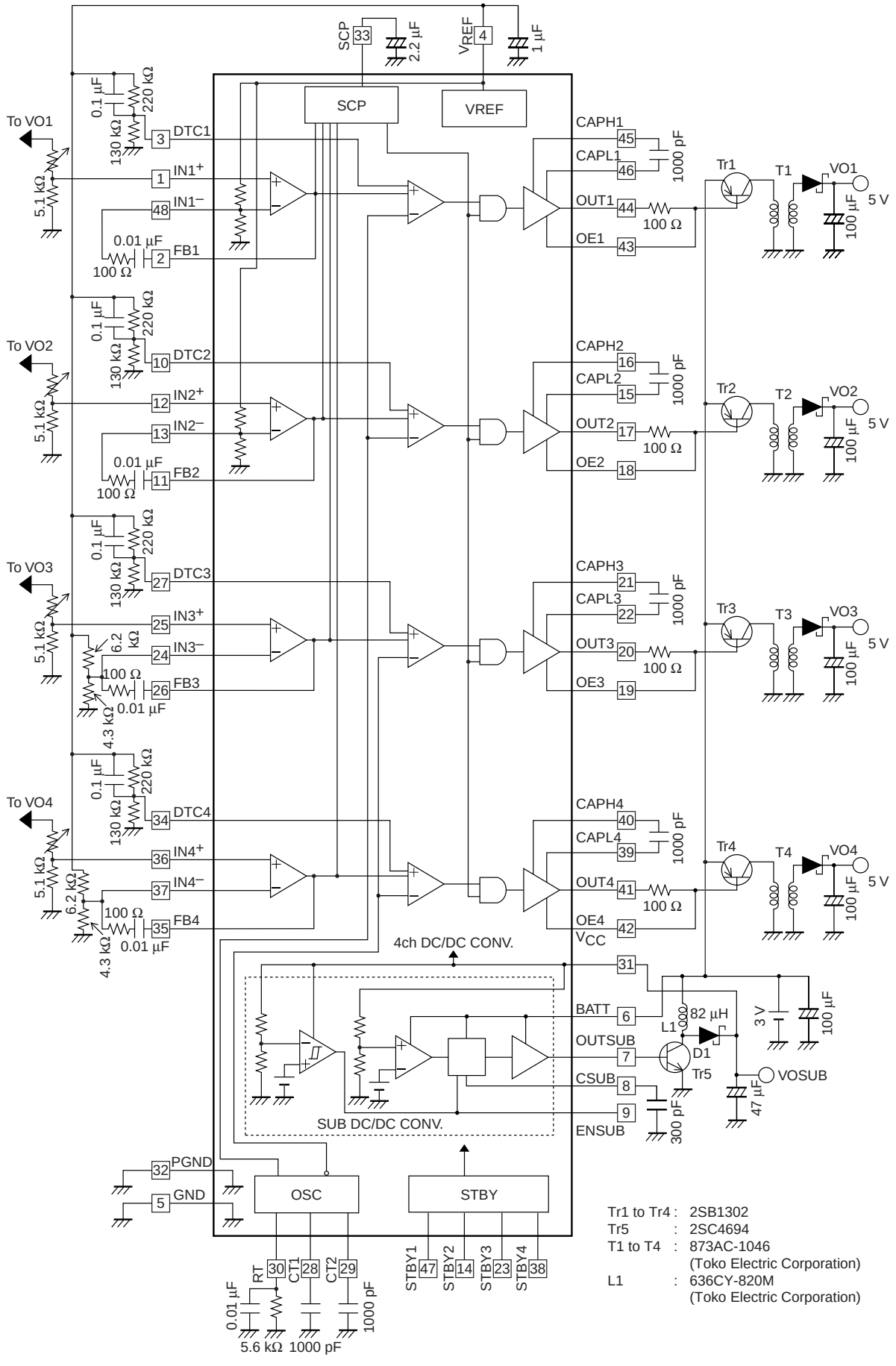
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Error Amplifier]						
IN- pin internal bias voltage	V_{LOW} FB	IN1− and IN2− pins	0.475	0.5	0.525	V
Low-level output voltage	V_{LOW} FB	IFB = 20 µA			1	V
High-level output voltage	VHi FB	IFB = –20 µA	2.25			V
Common-mode input voltage range	V_{ICM} IN		0		2	V
[Protection Circuits]						
Threshold voltage	V_{TH} SCP		1.1	1.25	1.4	V
SCP pin current	I_O SCP			3.8		µA
[Stop Period Adjustment Block]						
Input bias current	I_B DET		–15	–3		µA
Threshold voltage 1	$V_{TH}1$ DET	Duty cycle = 100%	0.35	0.4	0.45	V
Threshold voltage 2	$V_{TH}2$ DET	Duty cycle = 0%	0.67	0.77	0.87	V
[Output Block]						
OUT pin saturation voltage	V_{OSAT} OUT	I_{OUT} = +30 mA			0.6	V
OUT pin output voltage	V_O OE	I_{OUT} = –3 mA, CAPH = V_{CC}	2			V
[Triangle Wave Oscillator Block]						
Current setting pin voltage	V_T RT	R_T = 5.6 kΩ	1.19	1.26	1.33	V
Output current	I_{OH} CT	V_{CT} = 0.5 V, R_T = 5.6 kΩ		230		µA
Output current ratio	ΔI_O CT		0.8	1.0	1.2	
Oscillator frequency	$f_{OSC}1$		200	260	320	kHz
[Reference Voltage Block]						
Reference voltage	V_{REF}		1.19	1.26	1.33	V
Line regulation	VLN REF	V_{CC} = 1.8 V to 11 V		10		mV
Load regulation	VLD REF	I_O18 = –0.1 mA to –1 mA		10		mV
[Sub-Power Supply Circuit]						
VOSUB setting voltage	V_O SUB		2.1	2.2	2.3	V
OUTSUB pin source current	I_{OUT} SUB	V_{BAT} = 1.2 V, V_OSUB = V_{CC} = 1.8 V, V_{OUT}SUB = 0.7 V, CSUB = 0.9 V	1			mA
CSUB oscillator frequency	f_C SUB			100		kHz
EN comparator threshold voltage	V_{TH} ENSUB		3.0	3.1	3.2	V
EN comparator hysteresis	ΔV_{HYS} ENSUB		0.2	0.4	0.6	V
ENSUB shorted current	I_{EN} SUB				120	µA
[Standby Circuit]						
On voltage	V_{ON} STBY		1.15			V
Off voltage	V_{OFF} STBY				0.2	V
Pin input current	I_{IN} STBY	VSTBY = 3 V			70	µA
[All Circuits]						
Operating current drain	$I_{CC}1$	ENSUB = 0 V		7.5	10.5	mA
Standby mode current drain	$I_{CC}2$				10	µA



Pin Assignments



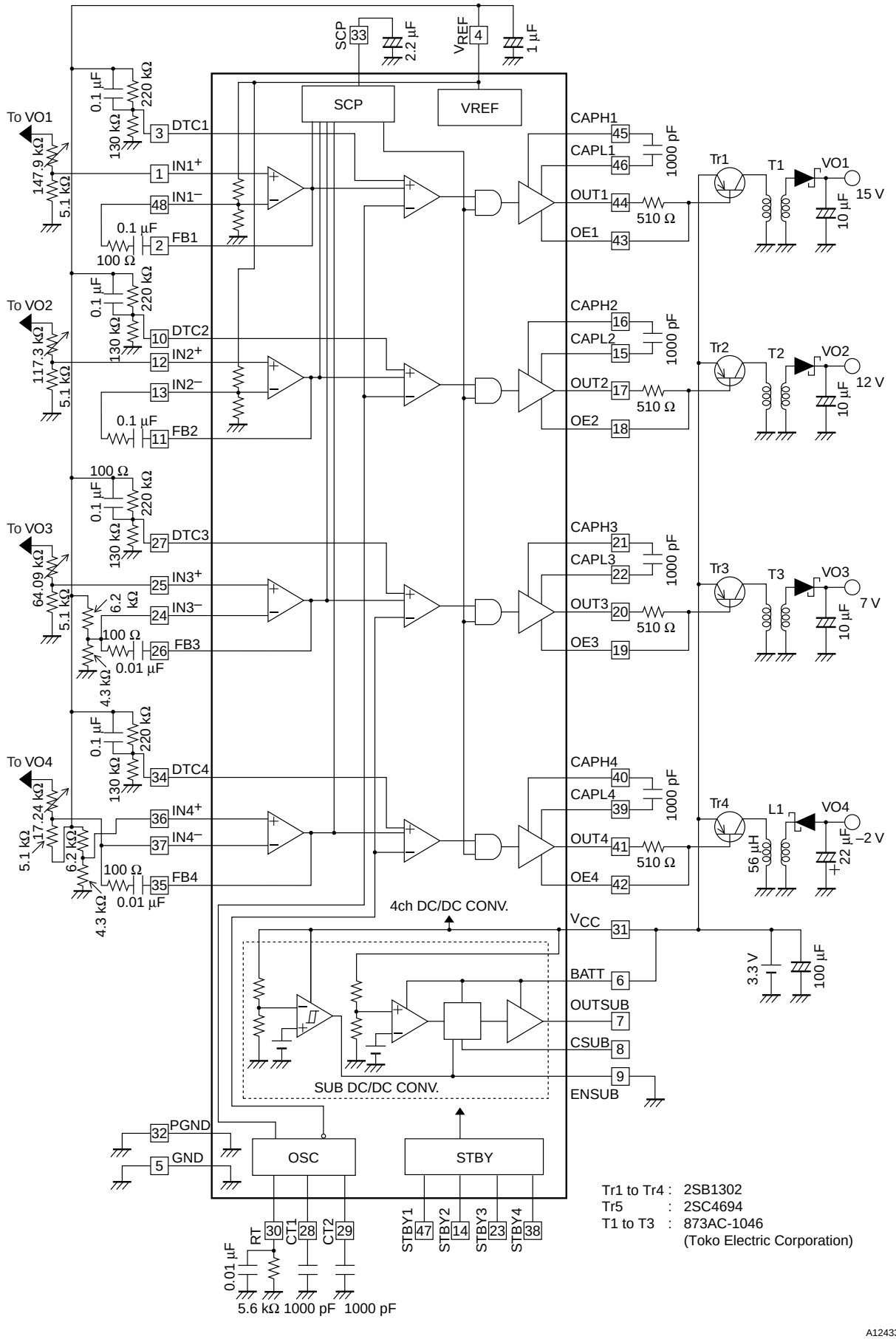
Block Diagram (Application Circuit Example 1)



Tr1 to Tr4 : 2SB1302
Tr5 : 2SC4694
T1 to T4 : 873AC-1046
(Toko Electric Corporation)
L1 : 636CY-820M
(Toko Electric Corporation)

A12432

Application Circuit Example 2



Relationship Between V_{BATT} and V_{CC}

Figure 1 shows the relationship between V_{BATT} and V_{CC} in the block diagram.
(Note that this applies when the forward voltage (VF) for D1 is 0.2 V and the loss in the resistive component of L1 is less than 0.2 V.)

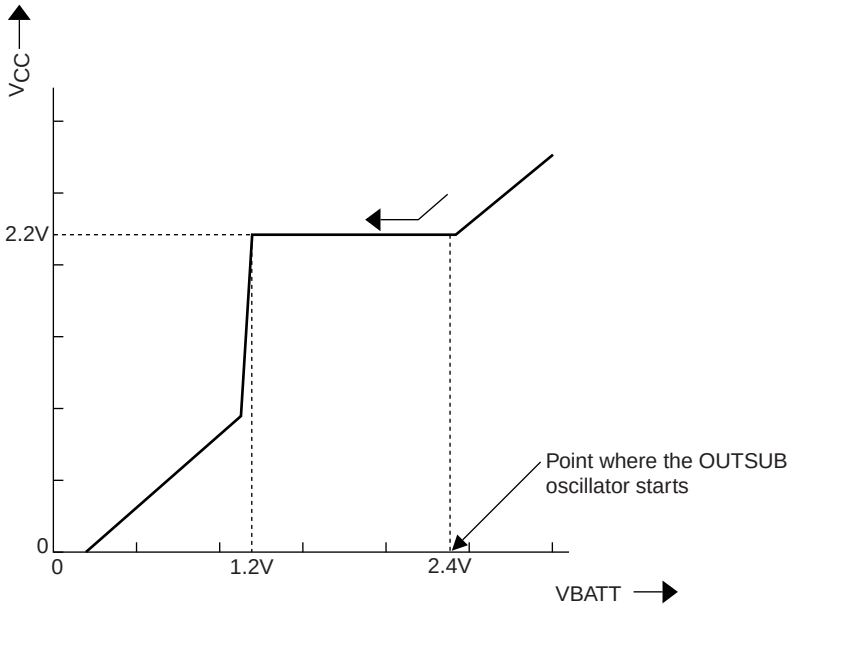


Figure 1 Relationship Between V_{BATT} and V_{CC}
(The voltage values in the figure are the typical values for the device.)

When the Sub-DC/DC Converter is not Used
The related pins must be connected as shown in figure 2.

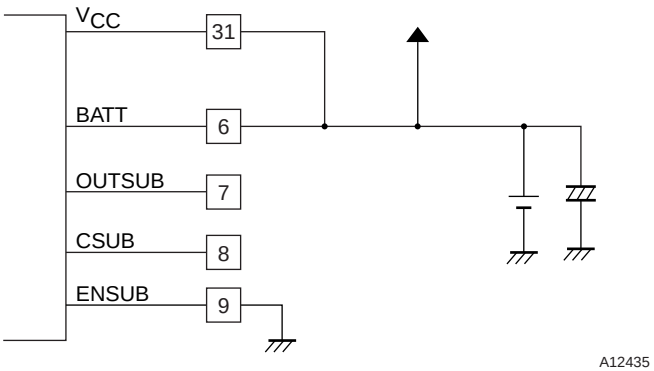


Figure 2 Peripheral Circuit when the Sub-DC/DC Converter is not Used

Notes on the Output Stage

Figure 3 shows the equivalent circuit for the output stage. The OUT pin operates as an open-collector output when the CAPL, CAPH, and OE pins are left open.

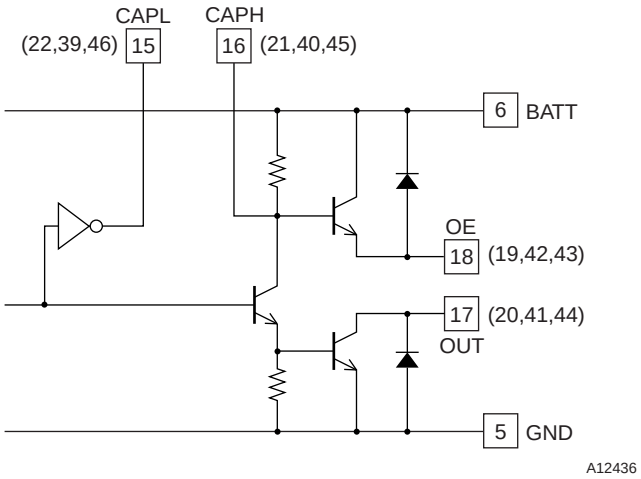


Figure 3 Output Stage Equivalent Circuit