

**LA5627W****Four-Channel Switching Regulator Controller****Overview**

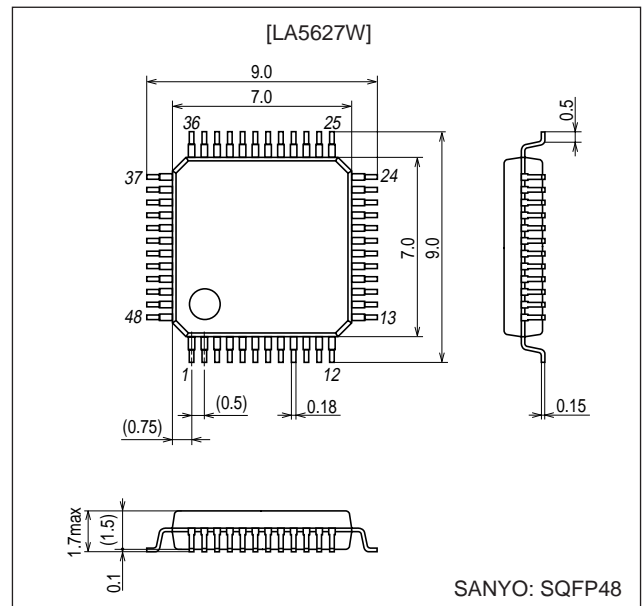
The LA5627W is a 4-channel switching regulator controller IC.

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	P _d max	Independent IC	0.45	W
Operating temperature	T _{opr}		-20 to +85	°C
Storage temperature	T _{stg}		-55 to +150	°C

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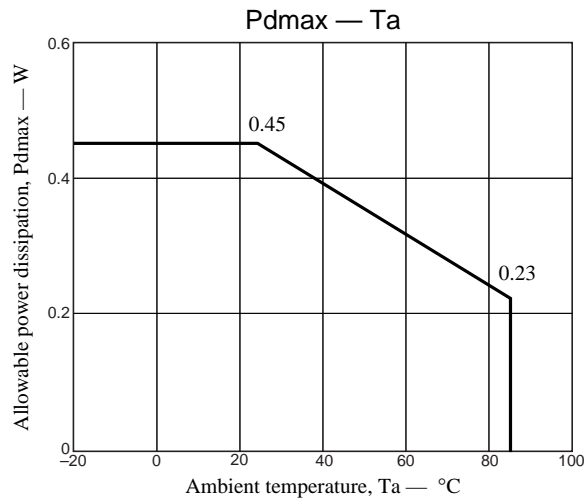
Operating Conditions at $T_a = 25^\circ\text{C}$

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	$I_{SINK\ max}$		0 to 30	mA
Reference voltage output current	I_{REF}		0 to 1	mA
Timing resistor value	RT		3 to 30	k Ω
Timing capacitor value	CT		100 to 1000	pF
Triangle wave frequency	f_{OSC}		0.1 to 1	MHz

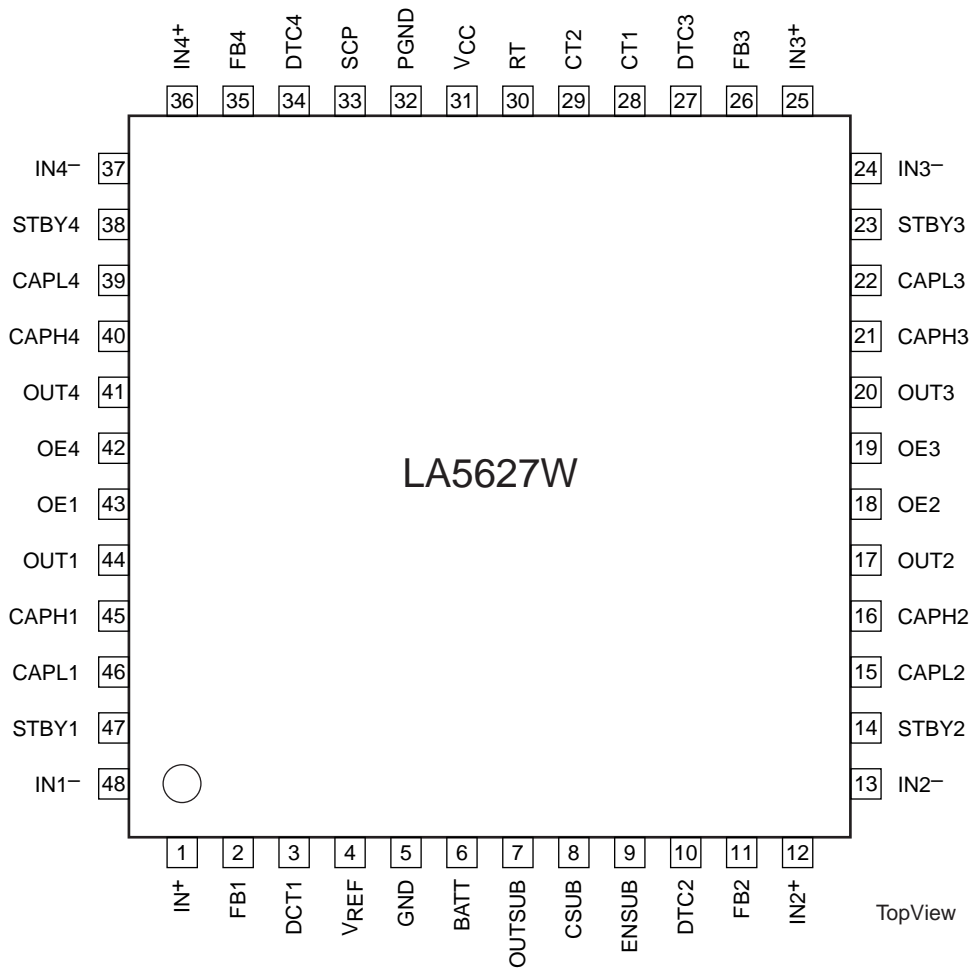
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 3\text{ V}$, $V_{STBY1\ to\ 4} = 3\text{ V}$

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	$V_{Hi\ FB}$	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	$V_{TH1\ DET}$	Duty cycle = 100%	0.35	0.4	0.45	V
Threshold voltage 2	$V_{TH2\ DET}$	Duty cycle = 0%	0.67	0.77	0.87	V
[Output Block]						
OUT pin saturation voltage	$V_{OSAT\ OUT}$	$I_{OUT} = +30\text{ mA}$			0.6	V
OUT pin output voltage	$V_O\ OE$	$I_{OUT} = -3\text{ mA}$, $C_{APH} = V_{CC}$	2			V
[Triangle Wave Oscillator Block]						
Current setting pin voltage	$V_T\ RT$	$R_T = 5.6\text{ k}\Omega$	1.19	1.26	1.33	V
Output current	$I_{OH\ CT}$	$V_{CT} = 0.5\text{ V}$, $R_T = 5.6\text{ k}\Omega$		230		μA
Output current ratio	$\Delta I_O\ CT$		0.8	1.0	1.2	
Oscillator frequency	f_{OSC1}		200	260	320	kHz
[Reference Voltage Block]						
Reference voltage	V_{REF}		1.19	1.26	1.33	V
Line regulation	$V_{LN\ REF}$	$V_{CC} = 1.8\text{ V to }11\text{ V}$		10		mV
Load regulation	$V_{LD\ REF}$	$I_{O18} = -0.1\text{ mA to }-1\text{ mA}$		10		mV
[Sub-Power Supply Circuit]						
VOSUB setting voltage	$V_O\ SUB$		2.1	2.2	2.3	V
OUTSUB pin source current	$I_{OUT\ SUB}$	$V_{BAT} = 1.2\text{ V}$, $V_{OSUB} = V_{CC} = 1.8\text{ V}$, $V_{OUTSUB} = 0.7\text{ V}$, $C_{SUB} = 0.9\text{ V}$	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	$\Delta V_{HYS\ ENSUB}$		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	$I_{IN\ STBY}$	$V_{STBY} = 3\text{ V}$			70	μA
[All Circuits]						
Operating current drain	I_{CC1}	$EN_{SUB} = 0\text{ V}$		7.5	10.5	mA
Standby mode current drain	I_{CC2}				10	μA

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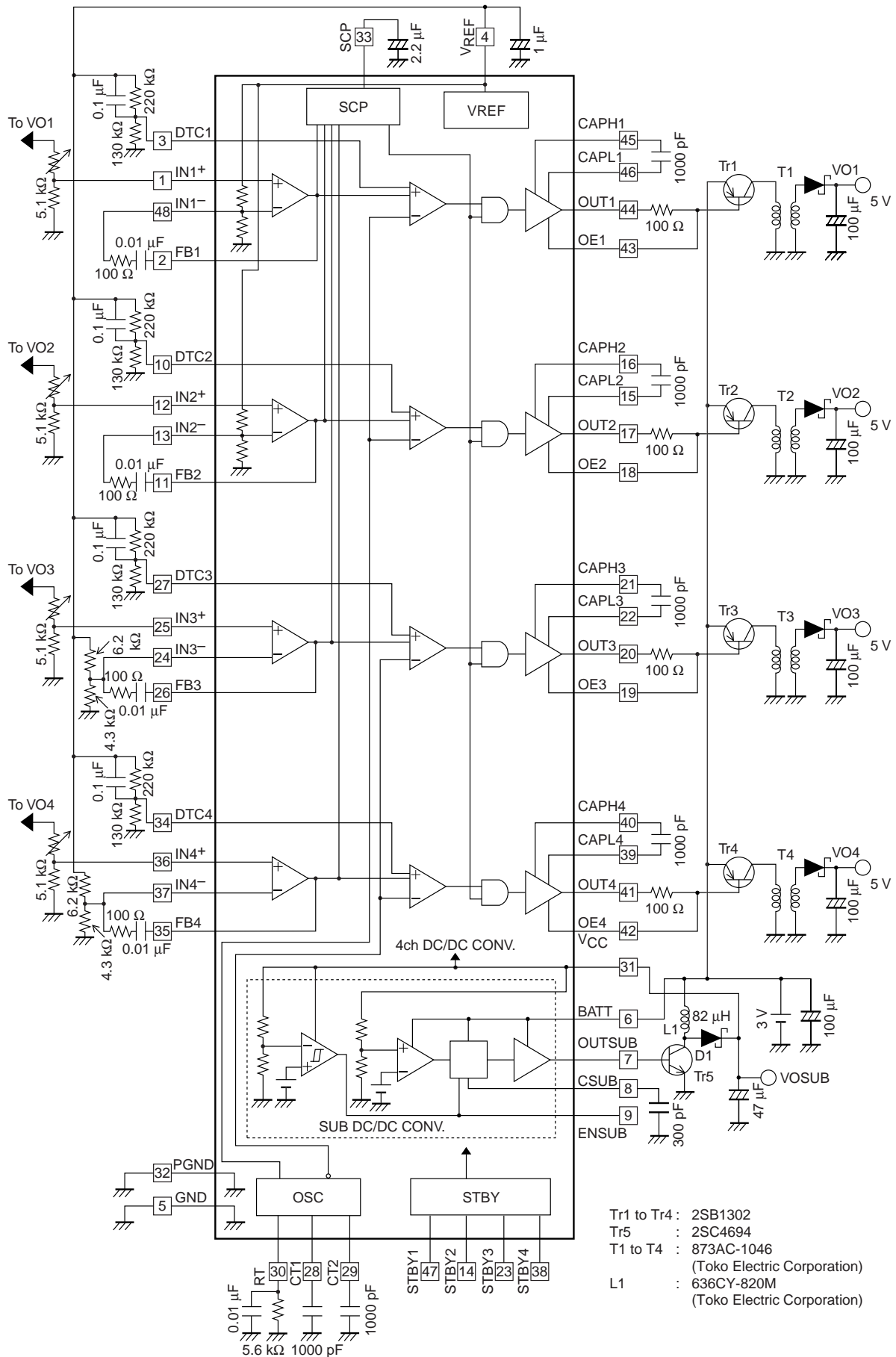


Pin Assignments

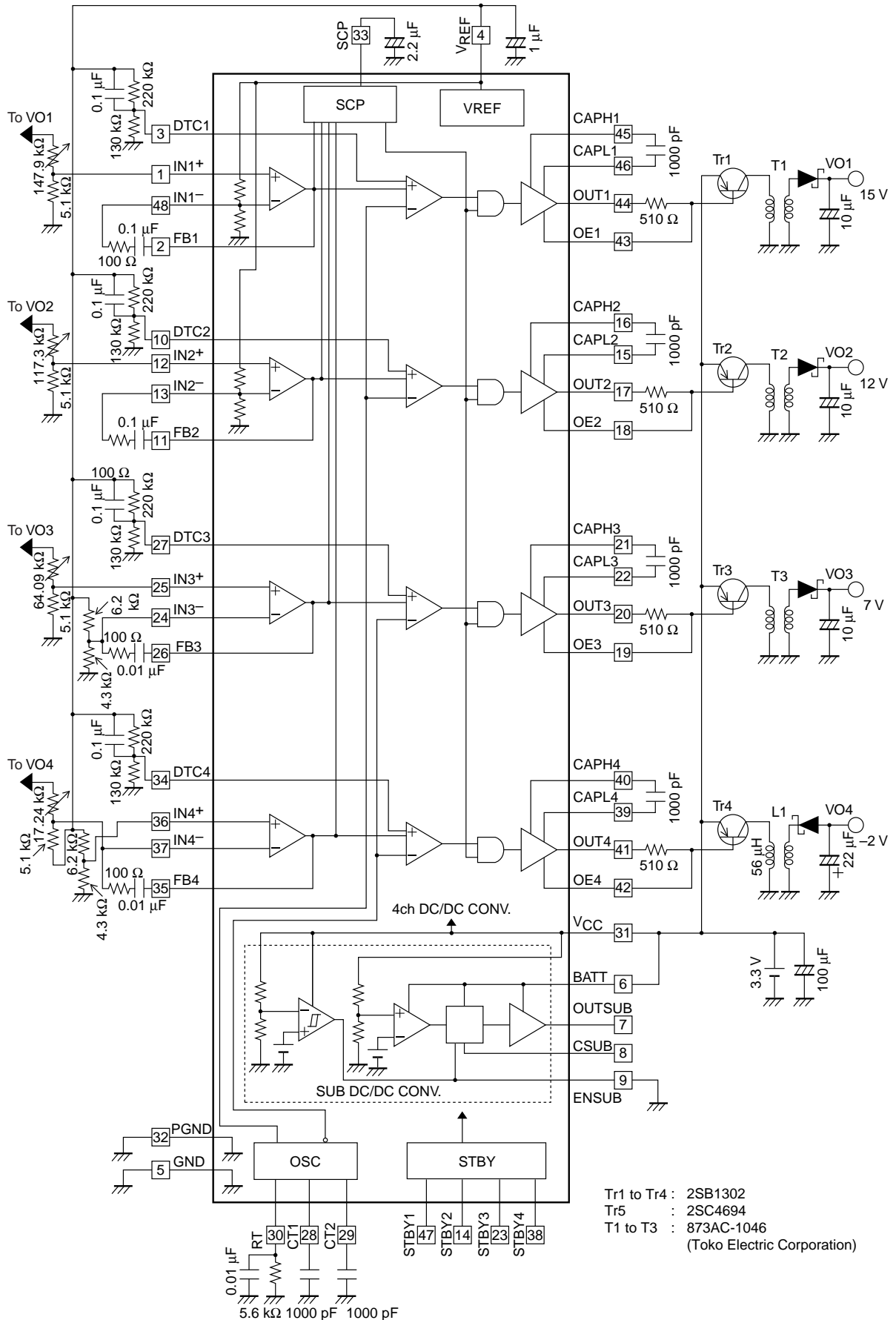


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Block Diagram (Application Circuit Example 1)

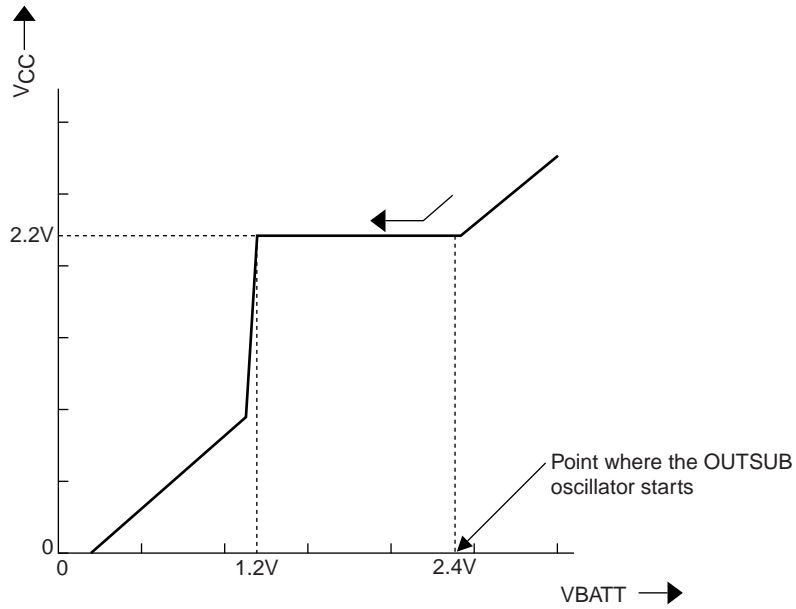


Application Circuit Example 2



Relationship Between V_{BATT} and V_{CC}

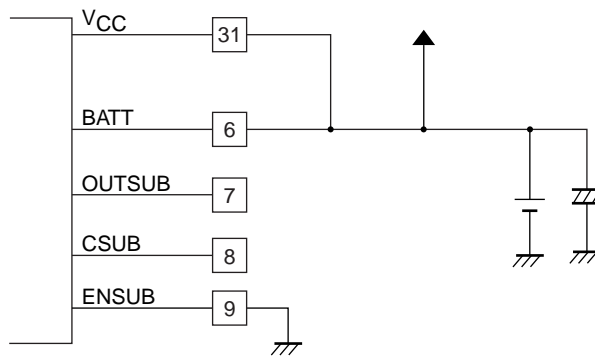
Figure 1 shows the relationship between V_{BATT} and V_{CC} in the block diagram.
 (Note that this applies when the forward voltage (VF) for D1 is 0.2 V and the loss in the resistive component of L1 is less than 0.2 V.)



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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.



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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.

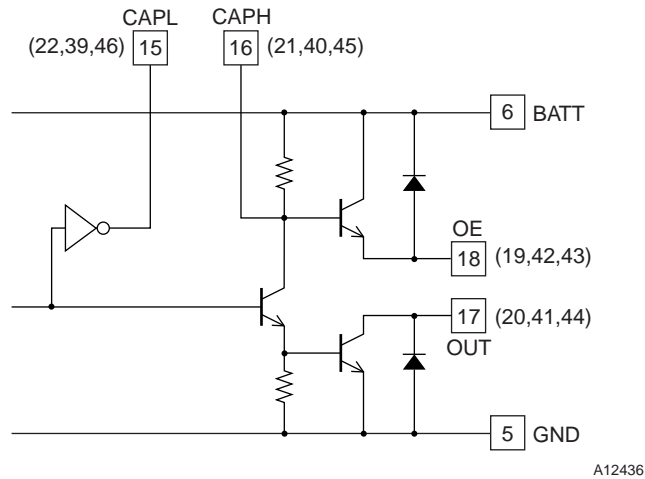


Figure 3 Output Stage Equivalent Circuit

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