STEP-UP DC/DC CONVERTER

NO.EA-298-190808

OUTLINE

The R1207N Series are CMOS-based PWM control type step-up DC/DC converter ICs with low supply current. Each of these ICs consists of an NMOS FET, a diode, an oscillator, a PWM comparator, a voltage reference unit, an error amplifier, a current limit circuit, an under voltage lockout circuit (UVLO), an over-voltage protection circuit (OVP), a soft-start circuit, a Maxduty limit circuit, and a thermal shutdown protection circuit. This step-up DC/DC converter can be easily built with a few external components such as a coil, a resistor, and a capacitor. As the protection functions, the R1207N Series have a Lx peak current limit function, an over voltage protection (OVP) function, an under voltage lock out (UVLO) function and a thermal shutdown function.

The R1207N Series present the R1207N8xxA version that is optimized for the constant voltage power source, and the R1207N8xxB/C version that is optimized for driving the white LED with the constant current. The R1207N8xxB/C is an adjustable version that can change the LED brightness dynamically by using a 200Hz to 300kHz PWM signal toward the CE pin.

The R1207N Series are available in TSOT-23-6 package.

FEATURES

- Input Voltage Range .... 2.3V to 5.5V (R1207N8xxA)
  1.8V to 5.5V (R1207N8xxB/C)
- Supply Current .... Typ. 800μA
- Standby Current .... Max. 5μA
- Feedback Voltage .... 1.0V±1.5% (R1207N8xxA)
  0.2V±10mV (R1207N8xxB)
  0.4V±10mV (R1207N8xxC)
- Oscillator Frequency .... Typ. 1.2MHz
- Maximum Duty Cycle .... Typ. 91%
- UVLO Function Typ.2.0V (Hys.Typ.0.2V) (R1207N8xxA)
  Typ.1.6V (Hys.Typ.0.1V) (R1207N8xxB/C)
- Lx Current Limit Function .... Select from 350mA, 700mA
- Over Voltage Protection .... Typ. 25V
- LED dimming control (R1207N8xxB/C) .... by external PWM signal (Frequency 200Hz to 300kHz)
- Thermal Protection Function .... Typ.150ºC(Hys.Typ.50ºC)
- Switch ON Resistance .... Typ. 1.35Ω
- Package TSOT-23-6
- Ceramic capacitors are recommended

APPLICATION

- Constant Voltage Power Source for portable equipment
- OLED power supply for portable equipment
- White LED Backlight for portable equipment

SELECTION GUIDE

The OVP threshold voltage, current limit and V_{FB}/Auto discharge are user-selectable options.

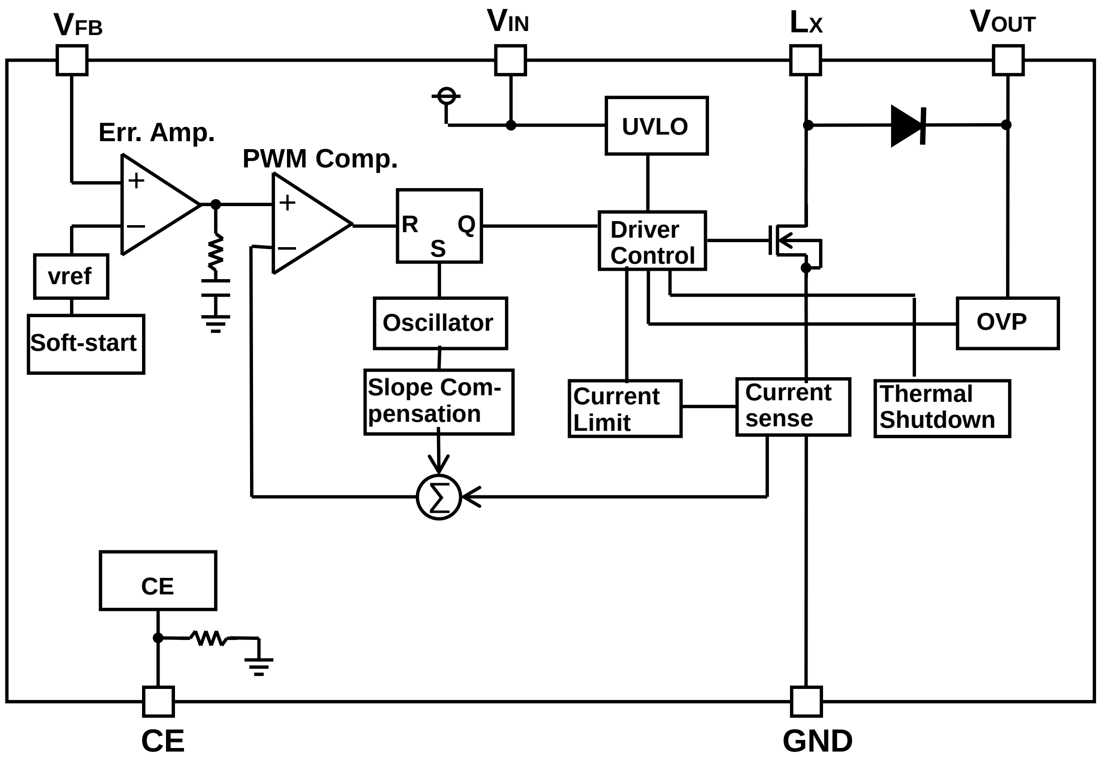
Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R1207N8x3∗-TR-FE	TSOT-23-6	3,000 pcs	Yes	Yes

x : Designation of current limit.
(1) 350mA
(2) 700mA

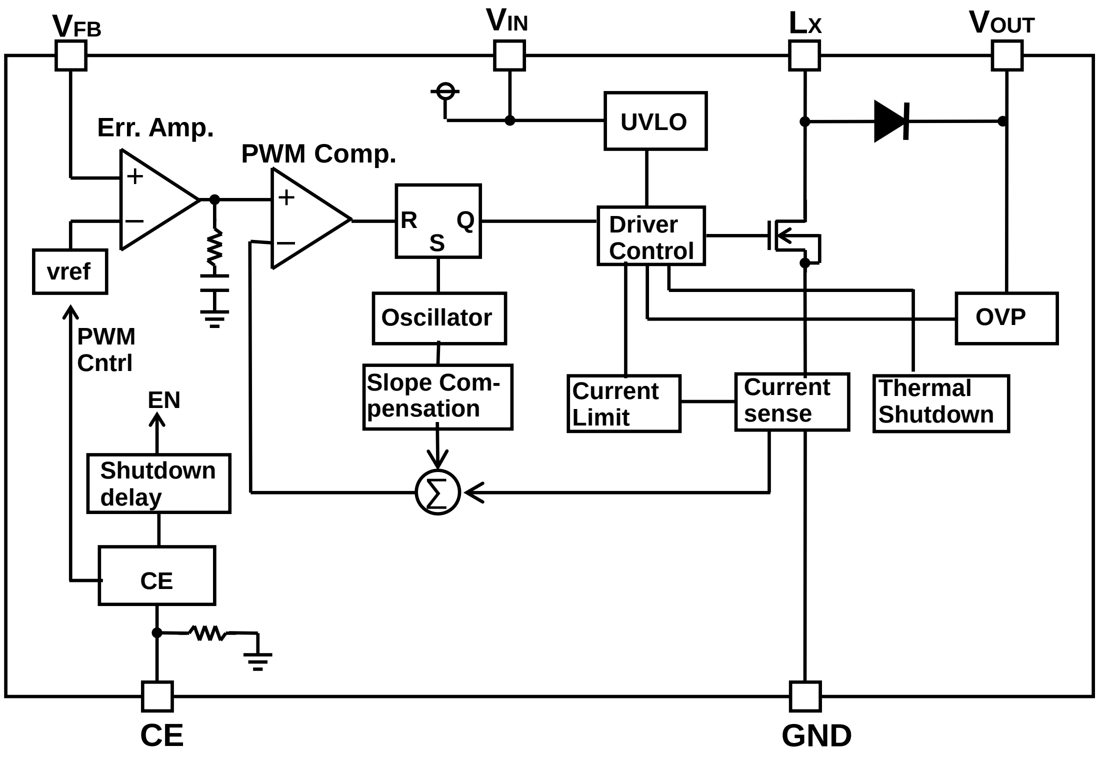
∗ : Designation of VFB.
(A) 1.0V
(B) 0.2V
(C) 0.4V

BLOCK DIAGRAMS

R1207N8xxA

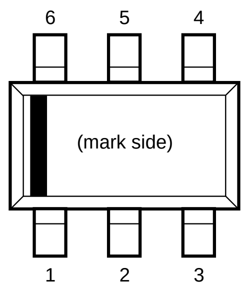


R1207N8xxB/C



PIN DESCRIPTIONS

TSOT-23-6



TSOT-23-6

Pin No	Symbol	Pin Description
1	L_X	Switching Pin (Open Drain Output)
2	GND	Ground Pin
3	V_{FB}	Feedback Pin
4	CE	Chip Enable Pin ("H" Active)
5	V_{OUT}	Output Pin
6	V_{IN}	Input Pin

ABSOLUTE MAXIMUM RATINGS

GND=0V

Symbol	Item	Rating	Unit
V_{IN}	V_{IN} Pin Voltage	–0.3 to 6.5	V
V_{CE}	CE Pin Voltage	–0.3 to 6.5	V
V_{FB}	V_{FB} Pin Voltage	–0.3 to 6.5	V
V_{OUT}	V_{OUT} Pin Voltage	–0.3 to 28	V
V_{LX}	L_X Pin Voltage	–0.3 to 28	V
I_{LX}	L_X Pin Current	1000	mA
P_D	Power Dissipation (TSOT-23-6)*	460	mW
Tj	Junction Temperature Range	–40 to 125	°C
Tstg	Storage Temperature Range	–55 to 125	°C

∗) Refer to *POWER DISSIPATION* for detailed information.

ABSOLUTE MAXIMUM RATINGS
Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause permanent damage and may degrade the life time and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Rating		Unit
V_{IN}	Operating Input Voltage	R1207N8xxA	2.3 to 5.5	V
		R1207N8xxB/C	1.8 to 5.5	V
Ta	Operating Temperature Range	−40 to 85		°C

RECOMMENDED OPERATING CONDITIONS
All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

ELECTRICAL CHARACTERISTICS

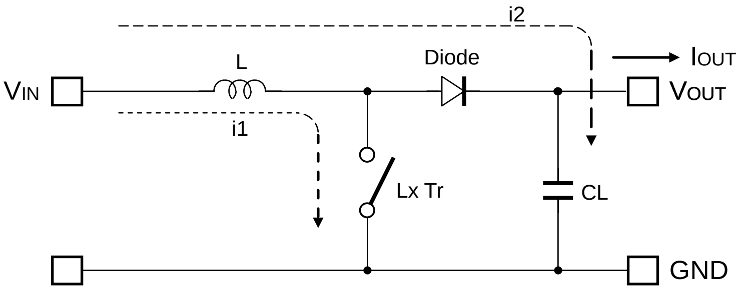
R1207N (Ta=25°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
I_{DD}	Supply Current	V_{IN}=5.5V, V_{FB}=0V , L_X at no load			0.8	1.2	mA
$I_{standby}$	Standby Current	V_{IN}=5.5V, V_{CE}=0V			1.0	5.0	μA
V_{UVLO1}	UVLO Detector Threshold	V_{IN} falling	R1207N8xxA	1.9	2.0	2.1	V
			R1207N8xxB/C	1.5	1.6	1.7	
V_{UVLO2}	UVLO Released Voltage	V_{IN} rising	R1207N8xxA		V_{UVLO1} +0.2	2.3	V
			R1207N8xxB/C		V_{UVLO1} +0.1	1.8	
V_{CEH}	CE Input Voltage "H"	V_{IN}=5.5V		1.5			V
V_{CEL}	CE Input Voltage "L"					0.5	V
R_{CE}	CE Pull Down Resistance				1200		kΩ
V_{FB}	V_{FB} Voltage Accuracy	V_{IN}=3.6V	R1207N8xxA	0.985	1.000	1.015	V
			R1207N8xxB	0.19	0.2	0.21	
			R1207N8xxC	0.39	0.4	0.41	
$\Delta V_{FB}/\Delta Ta$	V_{FB} Voltage Temperature Coefficient	V_{IN}=3.6V, $-40°C \leq Ta \leq 85°C$			±150		ppm /°C
I_{FB}	V_{FB} Input Current	V_{IN}=5.5V, V_{FB}=0V or 5.5V		-0.1		0.1	μA
t_{start}	Soft-start Time		R1207N8xxB/C		2.0	3.0	ms
R_{ON}	FET ON Resistance	I_{LX}=100mA			1.35		Ω
I_{OFF}	FET Leakage Current	V_{LX}=24V				3.0	μA
I_{LIM}	FET Current Limit		R1207N81xx	250	350	450	mA
			R1207N82xx	500	700	900	
V_F	Diode Forward Voltage	I_{SW}=100mA			0.8		V
$I_{DIODEleak}$	Diode Leakage Current	V_{OUT}=24V, V_{LX}=0V				10	μA
f_{OSC}	Oscillator Frequency	V_{IN}=3.6V, V_{FB}=0V		1000	1200	1400	kHz
Maxduty	Maximum Duty Cycle	V_{IN}=3.6V, V_{FB}=0V		86	91		%
V_{OVP1}	OVP Detect Voltage	V_{IN}=3.6V, V_{OUT} rising		24.2	25	25.8	V
V_{OVP2}	OVP Release Voltage	V_{IN}=3.6V, V_{OUT} falling			V_{OVP1} -1.8		V
T_{TSD}	Thermal Shutdown Detect Temperature	V_{IN}=3.6V			150		°C
T_{TSR}	Thermal Shutdown Release Temperature	V_{IN}=3.6V			100		°C

THEORY OF OPERATION

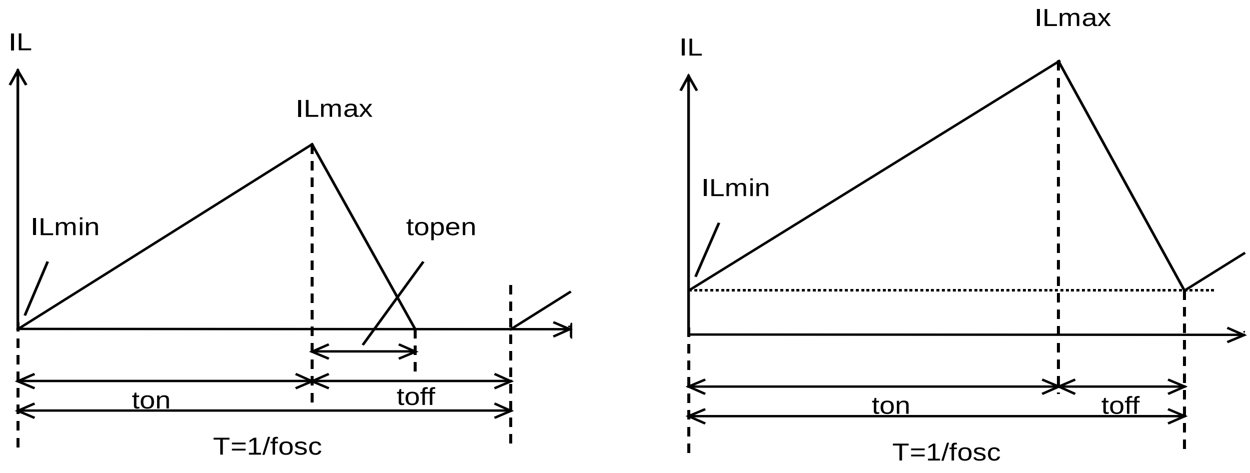
Operation of Step-Up DC/DC Converter and Output Current

<Basic Circuit>



<Current through L>

Discontinuous mode **Continuous mode**



There are two operation modes of the step-up PWM control-DC/DC converter. That is the continuous mode and discontinuous mode by the continuousness inductor.

When the transistor turns ON, the voltage of inductor L becomes equal to V_{IN} voltage. The increase value of inductor current (i1) will be

$$\Delta i1 = V_{IN} \times t_{on} / L \text{ .... Formula 1}$$

As the step-up circuit, during the OFF time (when the transistor turns OFF) the voltage is continually supply from the power supply. The decrease value of inductor current (i2) will be

$$\Delta i2 = (V_{OUT} - V_{IN}) \times t_{open} / L \text{ .... Formula 2}$$

At the PWM control-method, the inductor current become continuously when $t_{open}=t_{off}$, the DC/DC converter operate as the continuous mode.

In the continuous mode, the variation of current of i1 and i2 is same at regular condition.

$V_{IN} \times t_{on} / L = (V_{OUT} - V_{IN}) \times t_{off} / L$ .... Formula 3

The duty at continuous mode will be

duty (%)= $t_{on} / (t_{on} + t_{off}) = (V_{OUT} - V_{IN}) / V_{OUT}$ .... Formula 4

The average of inductor current at tf = t_{off} will be

$IL(Ave.) = V_{IN} \times t_{on} / (2 \times L)$ .... Formula 5

If the input voltage = output voltage, the I_{OUT} will be

$I_{OUT} = V_{IN}^2 \times t_{on} / (2 \times L \times V_{OUT})$ .... Formula 6

If the I_{OUT} value is large than above the calculated value (Formula 6), it will become the continuous mode, at this status, the peak current (IL_{max}) of inductor will be

$IL_{max} = I_{OUT} \times V_{OUT} / V_{IN} + V_{IN} \times t_{on} / (2 \times L)$ .... Formula 7

$IL_{max} = I_{OUT} \times V_{OUT} / V_{IN} + V_{IN} \times T \times (V_{OUT} - V_{IN}) / (2 \times L \times V_{OUT})$ .... Formula 8

The peak current value is larger than the I_{OUT} value. In case of this, selecting the condition of the input and the output and the external components by considering of IL_{max} value.
The explanation above is based on the ideal calculation, and the loss caused by L_X switch and the external components are not included.
The actual maximum output current will be between 50% and 80% by the above calculations. Especially, when the IL is large or V_{IN} is low, the loss of V_{IN} is generated with on resistance of the switch. Moreover, it is necessary to consider V_f of the diode (approximately 0.8V) about V_{OUT}.

- **Soft-Start (R1207N8xxB/C)**

The output and referrence of the error amplifier start from 0V and the referrence gradually rises up to 1.0V. After the softstart time (T_{SS}), output voltage rise up to the setting voltage.

The output of the error amplifier starts from 0V and the inrush current is suppressed when starting by the CE pin "H" input. Moreover, the inrush current can be suppressed by gradually enlarging Duty of the PWM signal to the CE pin.

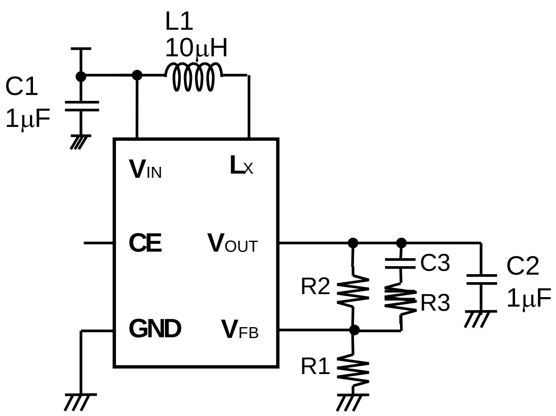
- **Current Limit Function**

Current limit function monitors the over current and if it reaches the peak current, it will turn off the driver. When the over current decreases, it will restart oscillation and will restart the monitoring.

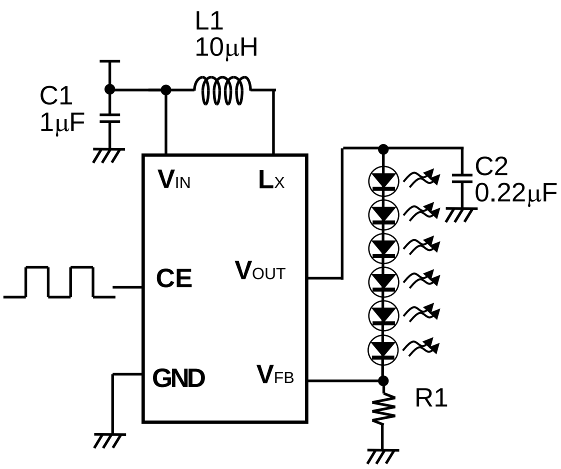
APPLICATION INFORMATION

Typical Applications

R1207N8xxA



R1207N8xxB/C



- **Inductor Selection**

The peak current of the inductor at normal mode can be estimated as the next formula when the efficiency is 80%.

$$I_{Lmax}=1.25 \times I_{OUT} \times V_{OUT} / V_{IN} + 0.5 \times V_{IN} \times (V_{OUT} - V_{IN}) / (L \times V_{OUT} \times f_{osc})$$

In the case of start-up or dimming control by CE pin, inductor transient current flows, and the peak current of it must be equal or less than the current limit of the IC. The peak current should not beyond the rated current of the inductor. The recommended inductance value is 10μH - 22μH.

Table 1 Peak current value in each condition

Condition				
V_{IN} (V)	V_{OUT} (V)	I_{OUT} (mA)	L (μH)	I_{Lmax} (mA)
3	14	20	10	215
3	14	20	22	160
3	21	20	10	280
3	21	20	22	225

Table 2 Recommended inductors

L (μH)	Part No.	Rated Current (mA)	Size (mm)
10	LQH32CN100K53	450	3.2x2.5x1.55
10	LQH2MC100K02	225	2.0x1.6x0.9
10	VLF3010A-100	490	2.8x2.6x0.9
10	VLS252010-100	520	2.5x2.0x1.0
22	LQH32CN220K53	250	3.2x2.5x1.55
22	LQH2MC220K02	185	2.0x1.6x0.9
22	VLF3010A-220	330	2.8x2.6x0.9

- **Capacitor Selection**

Set 1μF or more value bypass capacitor C1 between V_{IN} pin and GND pin as close as possible.

R1207NxxxA

Set 1μF – 4.7μF or more capacitor C2 between V_{OUT} and GND pin.

Table 3-A Recommended components for R1207NxxxA

	Rated voltage(V)	Part No.
C1	6.3	CM105B105K06
C2	25	GRM21BR11E105K
C3	25	22pF
R1		For V_{OUT} Setting
R2		For V_{OUT} Setting
R3		2kΩ

If the transient drop of output voltage by the load fluctuation is large and exceeds the allowable range in above setting, refer to Table 3-B to change the capacitors of C2 and C3 for the response improvement and the transient voltage drop reduction.

Table 3-B Recommended components for R1207xxxxA

	Rated voltage(V)	Part No.
C1	6.3	CM105B105K06
C2	50	GRM31CR71H475M
C3	25	220pF
R1		For V_{OUT} Setting
R2		For V_{OUT} Setting
R3		2kΩ

R1207NxxxB/C

Set 0.22μF or more capacitor C2 between V_{OUT} and GND pin. (R1207N8xxB)
Set 0.47μF or more capacitor C2 between V_{OUT} and GND pin. (R1207N8xxC)
Note the V_{OUT} that depends on LED used, and select the rating of V_{OUT} or more.

Table 4 Recommended components for R1207NxxxB/C

	Rated voltage(V)	Part No.
C1	6.3	CM105B105K06
C2	25	GRM21BR11E224
	25	C2012X7R1E474K
	50	GRM21BR71H224

- **External Components Setting**

If the V_{OUT} spike noise is high, it may influence on the V_{FB} pin to cause the operation of R1205x8xxA unstable. To reduce the noise coming into V_{FB} pin, please place a 1kΩ to 5kΩ resistor in R3 in Fig. 1.

- **Application of Using 5.5V or more Power Supply**

Other than the IC power supply, if there is a power supply greater than 5.5V, the high power output can be achieved by using the power supply as an inductor power supply. In this case, please place a capacitor between an inductor power supply and GND (shown in Fig. 2) aside from a bypass capacitor between the V_{IN} pin and GND of the IC.

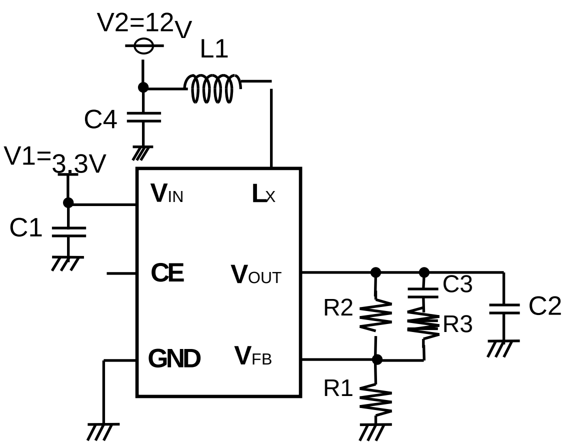


Fig. 1 R1207N8xxA

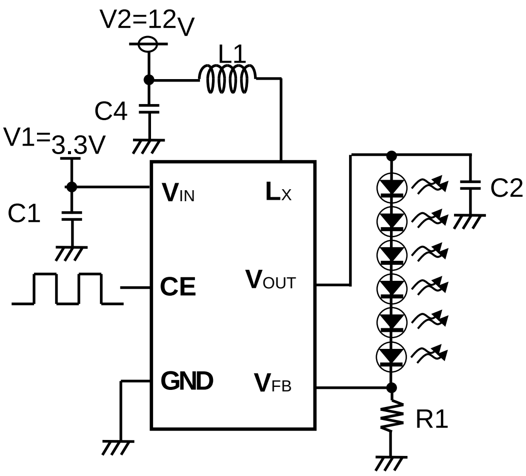


Fig. 2 R1207N8xxB/C

- **The Method of Output Voltage Setting (R1207N8xxA)**

The output voltage (V_{OUT}) can be calculated with divider resistors (R1 and R2) values as the following formula:

Output Voltage (V_{OUT}) = V_{FB} × (R1 + R2) / R1

The total value of R1 and R2 should be equal or less than 300kΩ. Make the V_{IN} and GND line sufficient. The large current flows through the V_{IN} and GND line due to the switching. If this impedance (V_{IN} and GND line) is high, the internal voltage of the IC may shift by the switching current, and the operating may become unstable. Moreover, when the built-in L_X switch is turn OFF, the spike noise caused by the inductor may be generated. As a result of this, recommendation voltage rating of capacitor (C2) value is equal 1.5 times larger or more than the setting output voltage.

- **LED Current setting (R1207N8xxB/C)**

When CE pin input is "H" (Duty=100%), LED current can be set with feedback resistor (R1)

I_{LED} = V_{FB} / R1

- **LED Dimming Control (R1207N8xxB/C)**

The LED brightness can be controlled by inputting the PWM signal to the CE pin. If the CE pin input is "L" in the fixed time (Typ.0.5ms), the IC becomes the standby mode and turns OFF LEDs.

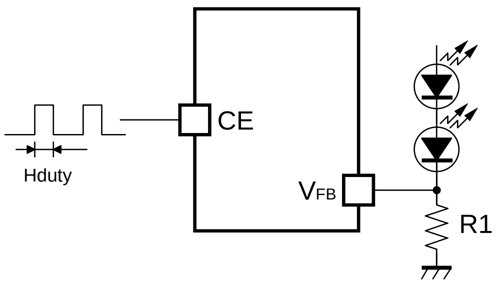
The current of LEDs can be controlled by Duty of the PWM signal of the input CE pin. The current of LEDs when High-Duty of the CE input is ”Hduty” reaches the value as calculatable following formula.

$$I_{LED} = \text{Hduty} \times V_{FB} / R1$$

The frequency of the PWM signal is using the range between 200Hz to 300kHz.

When controlling the LED brightness by the PWM signal of 5kHz or less, R1207N8xxB/C are recomended to avoide discharge function during dimming control.

When controlling the LED brightness by the PWM signal of 20kHz or less, the increasing or decreasing of the inductor current might be make a sounds in the hearable sound wave area. In that case, please use the PWM signal in the high frequency area.



Dimming Control by CE Pin Input

- **Low luminance Dimming Accuracy (R1207N8xxC)**

Low luminance Dimming filtered V_{FB} voltage tolerance depends on the offset voltage of the internal DC/DC converter. By this offset voltage, some voltage difference may be generated between VREF voltage and V_{FB} voltage. Low luminance Dimming Accuracy is shown below.

Low luminance Dimming Accuracy for R1207N8xxC (R1=20ohm)

The duty of a PWM signal for the CE pin	I_{LED} Min.	I_{LED} Max.
3.5% (Frequency = 20kHz ~ 300kHz)	0.01mA*2	2.1mA*2

*2 guaranteed by design engineering (Ta=25 ºC)

TECHNICAL NOTES

● Current Path on PCB

The current paths in an application circuit are shown in Fig. 3 and 4.
A current flows through the paths shown in Fig. 3 at the time of MOSFET-ON, and shown in Fig. 4 at the time of MOSFET-OFF. In the paths pointed with red arrows in Fig. 4, current flows just in MOSFET-ON period or just in MOSFET-OFF period. Parasitic impedance / inductance and the capacitance of these paths influence stability of the system and cause noise outbreak. So please minimize this side effect. In addition, please shorten the wiring of other current paths shown in Fig. 3 and 4 except for the paths of LED load.

● Layout Guide for PCB

- Please shorten the wiring of the input capacitor (C1) between V_{IN} pin and GND pin of IC. The GND pin should be connected to the strong GND plane.
- The area of L_X land pattern should be smaller.
- Please put output capacitor (C2) close to the V_{OUT} pin.
- Please make the GND side of output capacitor (C2) close to the GND pin of IC.

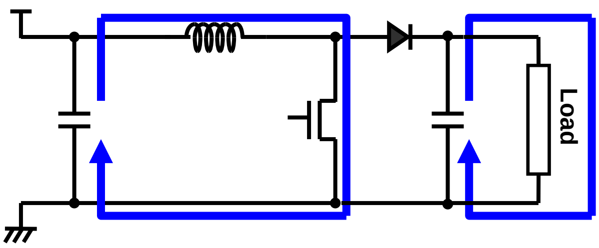


Fig. 3 MOSFET-ON

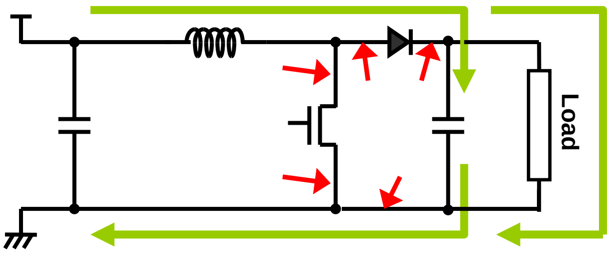
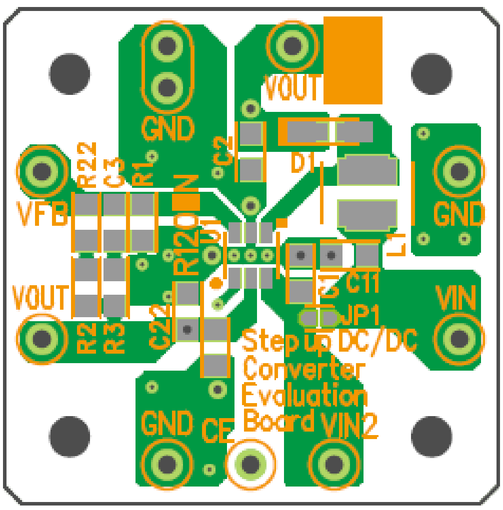
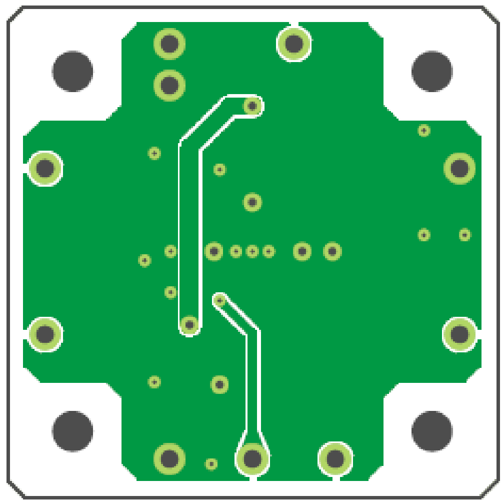


Fig. 4 MOSFET-OFF

● PCB Layout

R1207N (PKG: TSOP-23-6pin)

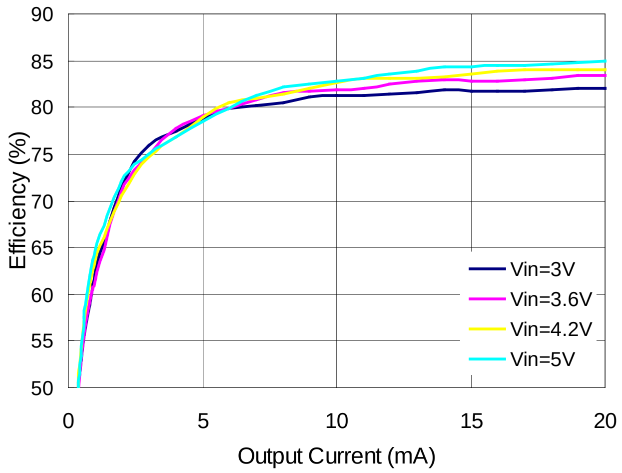
Top Layer	Back Layer
	

U1-■ indicates the position of No.1 pin.

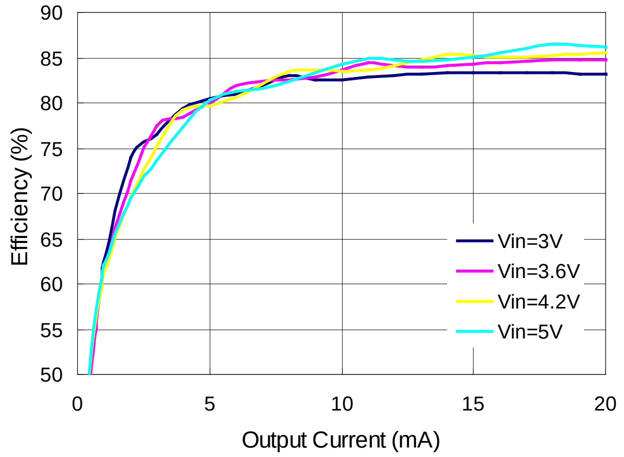
TYPICAL CHARACTERISTICS

1) Efficiency vs. Output Current Characteristics (R1207N823A)

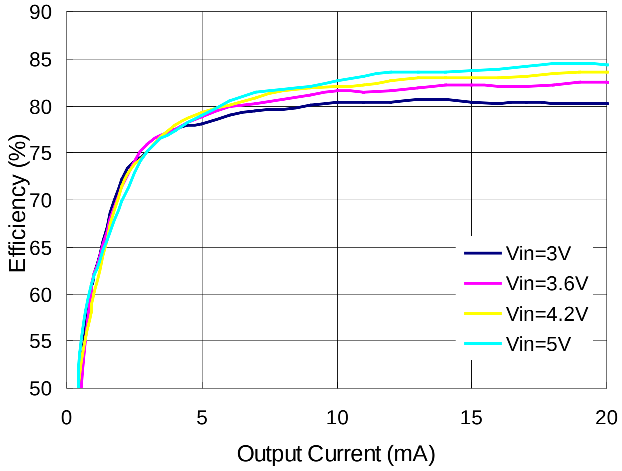
V_{OUT}=10V, L=10µH (LQH32CN100K53)



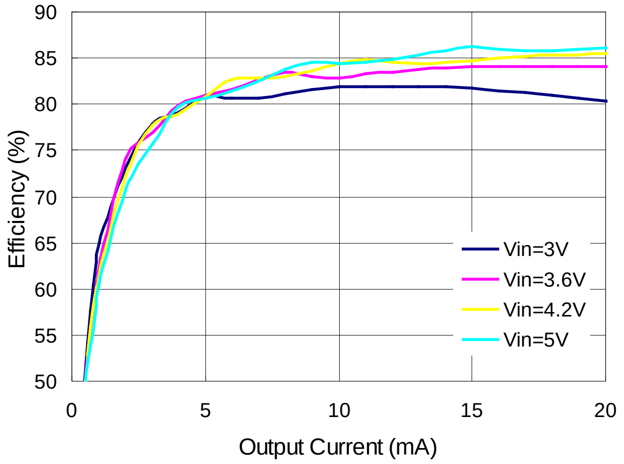
V_{OUT}=10V, L=22µH (LQH32CN220K53)



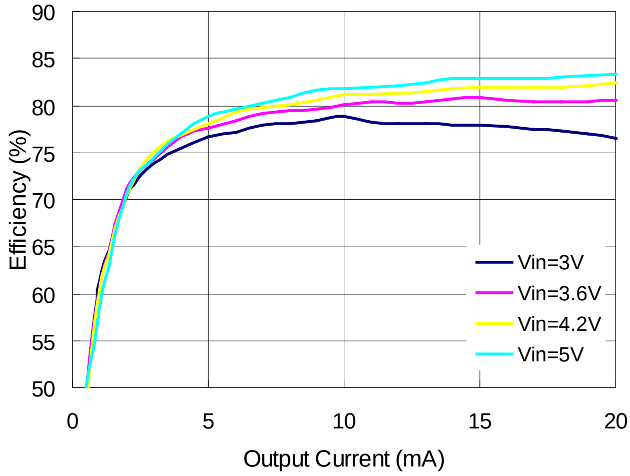
V_{OUT}=15V, L=10µH (LQH32CN100K53)



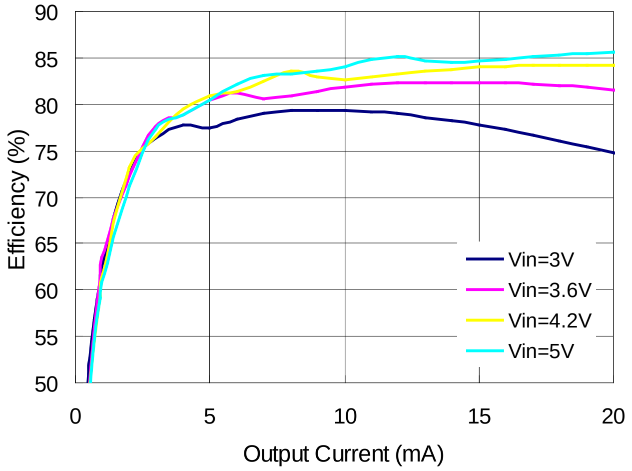
V_{OUT}=15V, L=22µH (LQH32CN220K53)



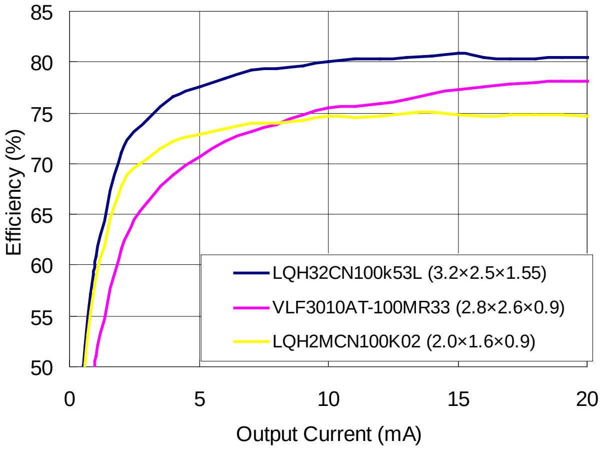
V_{OUT}=20V, L=10µH (LQH32CN100K53)



V_{OUT}=20V, L=22µH (LQH32CN220K53)

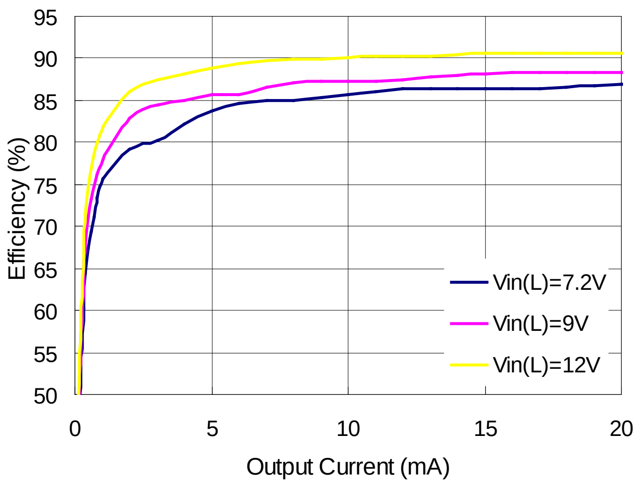


V_{OUT}=20V, V_{IN}=3.6V

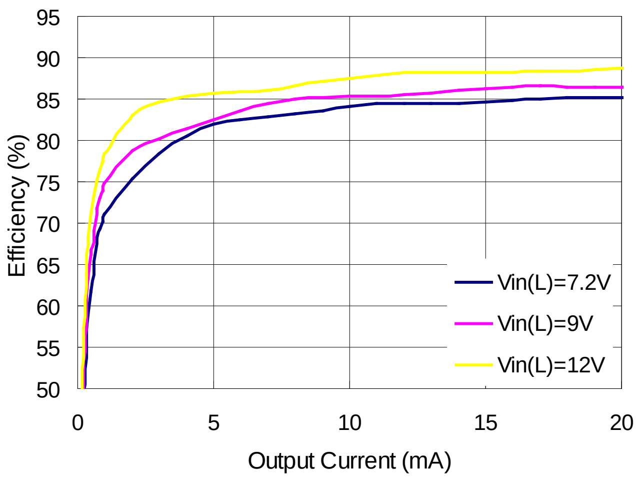


Typical Applications with Using 5.5V or Greater

V_{OUT}=15V, L=10µH (LQH32CN100K53)

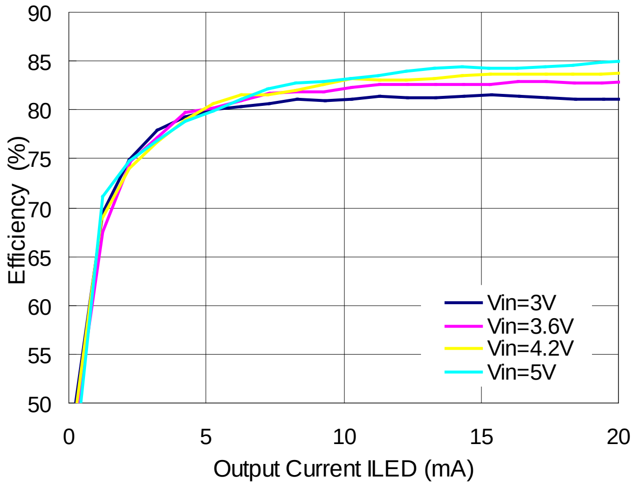


V_{OUT}=20V, L=10µH (LQH32CN100K53)

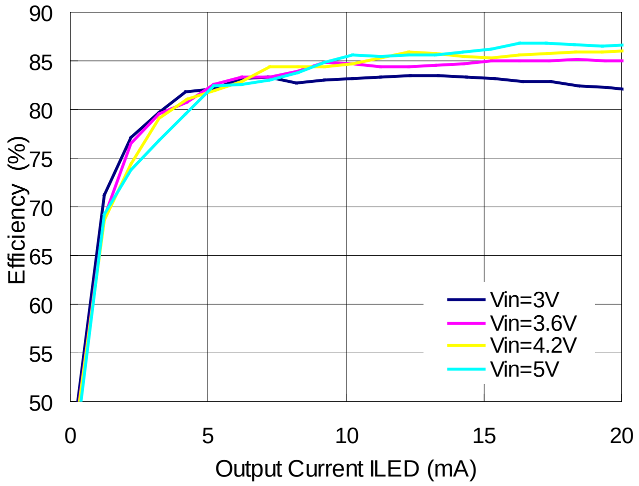


2）Efficiency vs. Output Current Characteristics (R1207N823B/C)

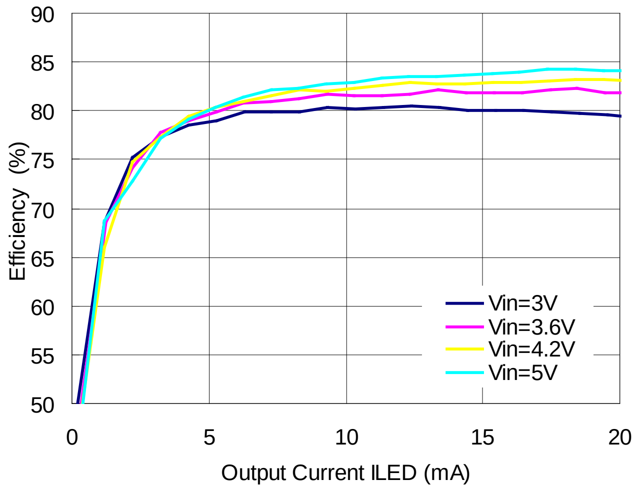
4LED, L=10µH (LQH32CN100K53)



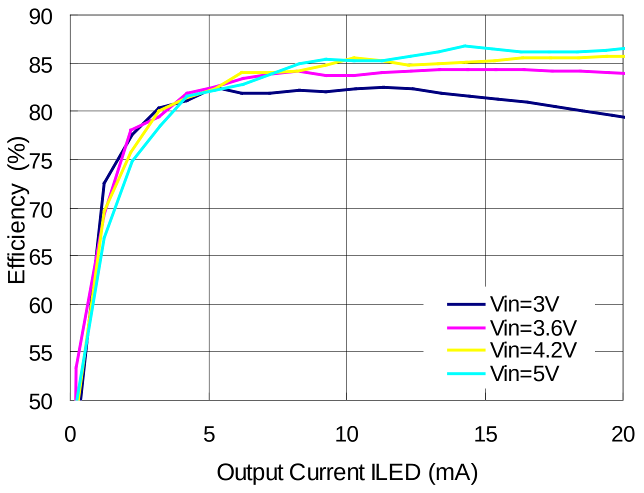
4LED, L=22µH (LQH32CN220K53)



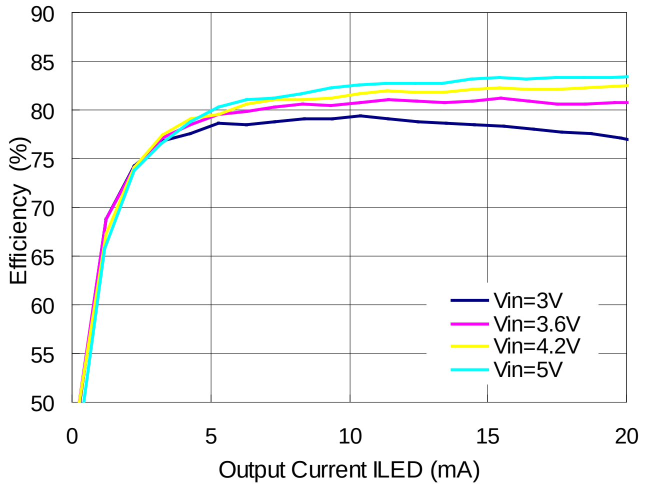
5LED, L=10μH (LQH32CN100K53)



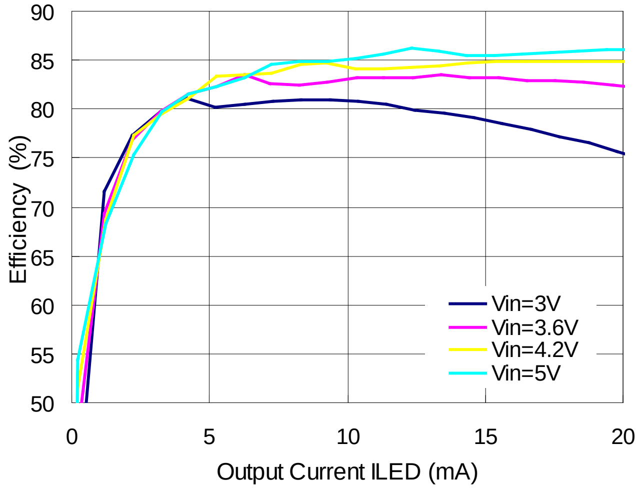
5LED, L=22μH (LQH32CN220K53)



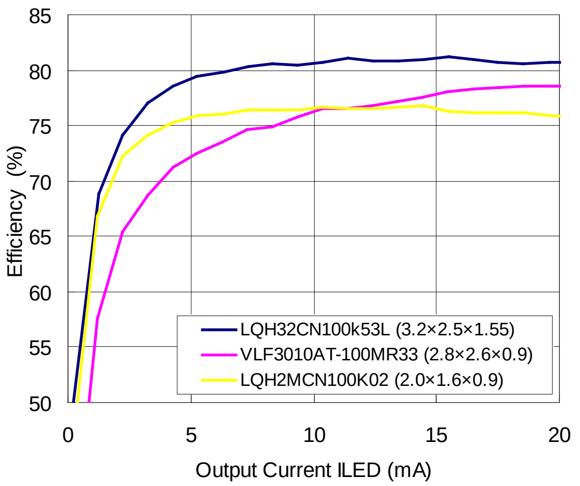
6LED, L=10μH (LQH32CN100K53)



6LED, L=22μH (LQH32CN220K53)

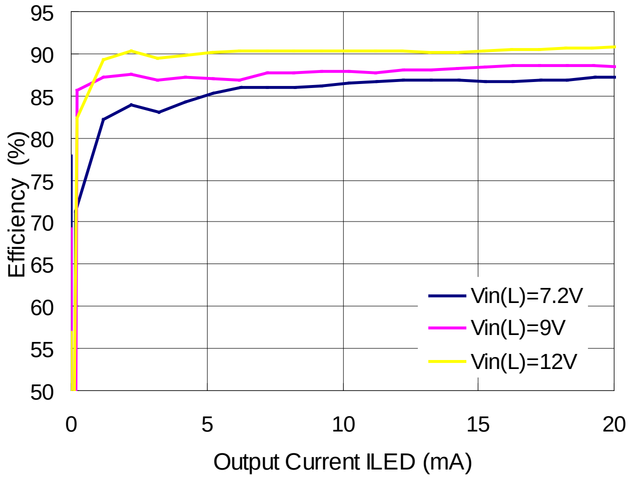


6LED, V_{IN}=3.6V

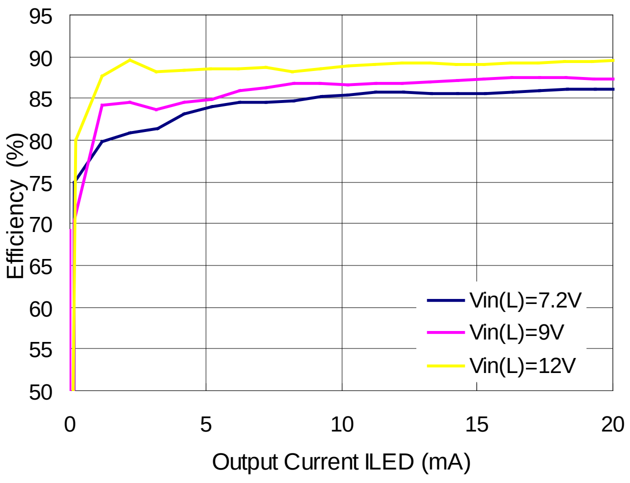


Typical Applications with Using 5.5V or Greater

5LED, V_{IN}(IC)=3.6V

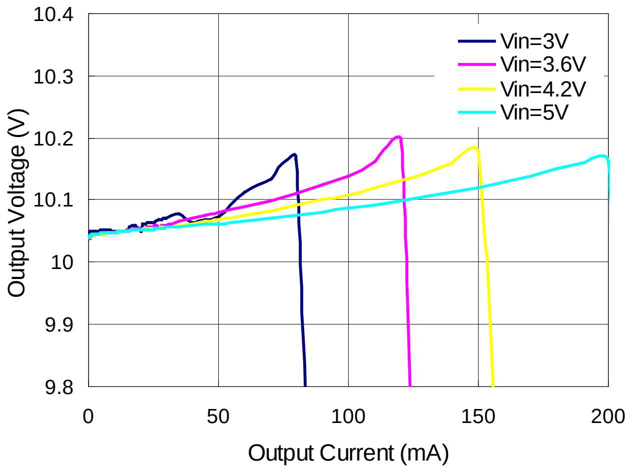


6LED, V_{IN}(IC)=3.6V

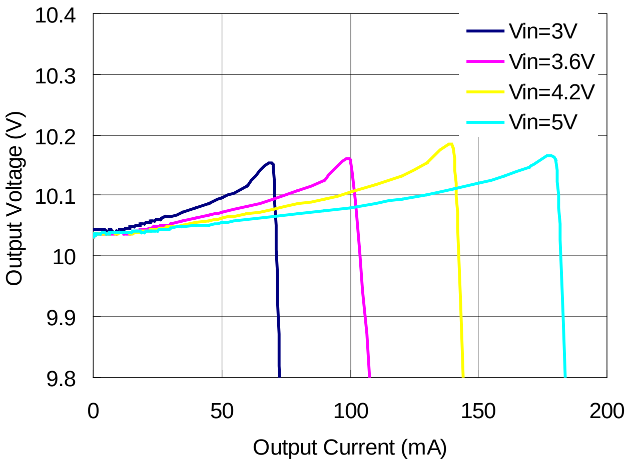


3) Output Voltage vs. Output Current (R1207N823A)

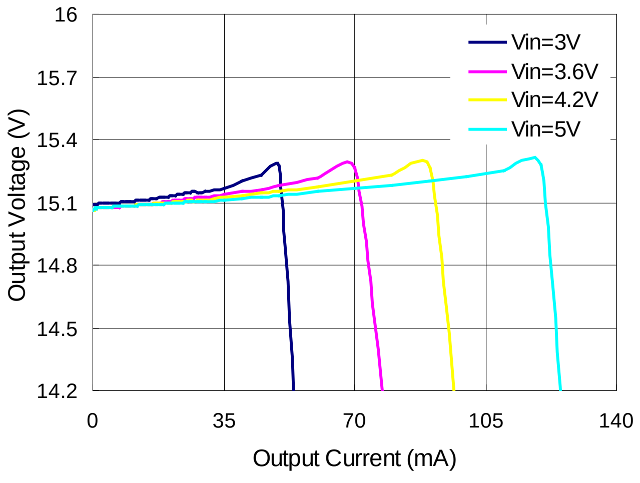
V_{OUT}=10V, L=10µH (LQH32CN100K53)



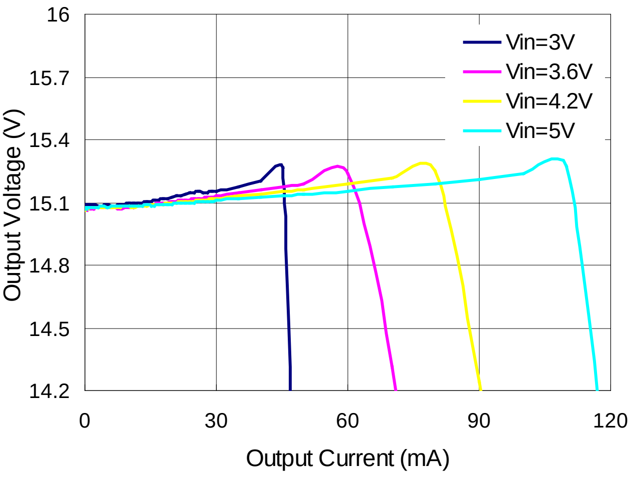
V_{OUT}=10V, L=22µH (LQH32CN220K53)



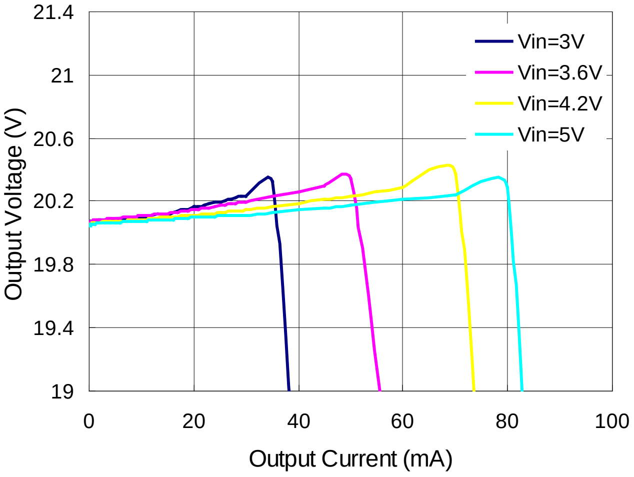
V_{OUT}=15V, L=10µH (LQH32CN100K53)



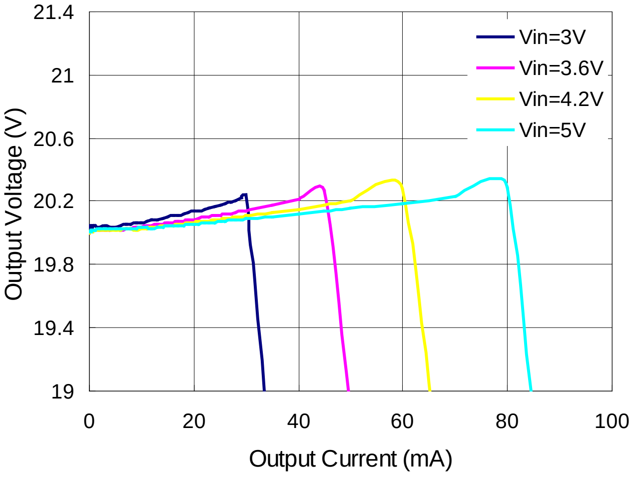
V_{OUT}=15V, L=22µH (LQH32CN220K53)



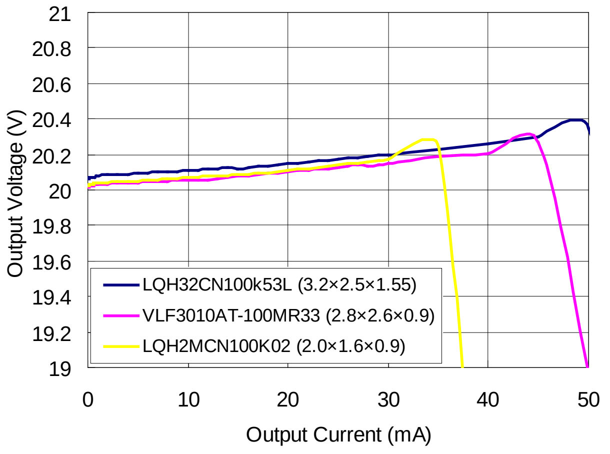
V_{OUT}=20V, L=10μH (LQH32CN100K53)



V_{OUT}=20V, L=22μH (LQH32CN220K53)

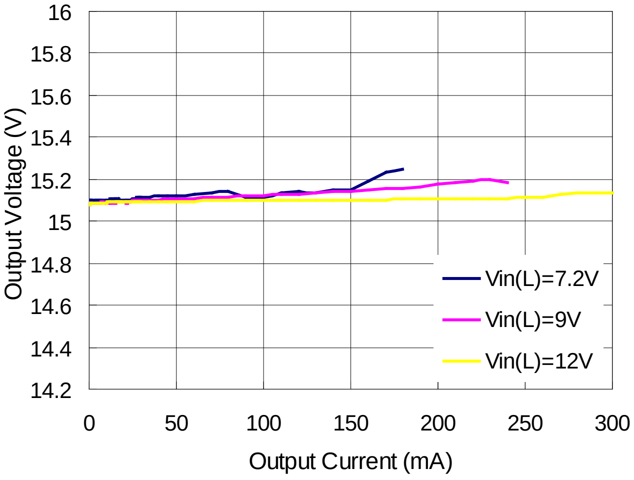


V_{OUT}=20V, V_{IN}=3.6V

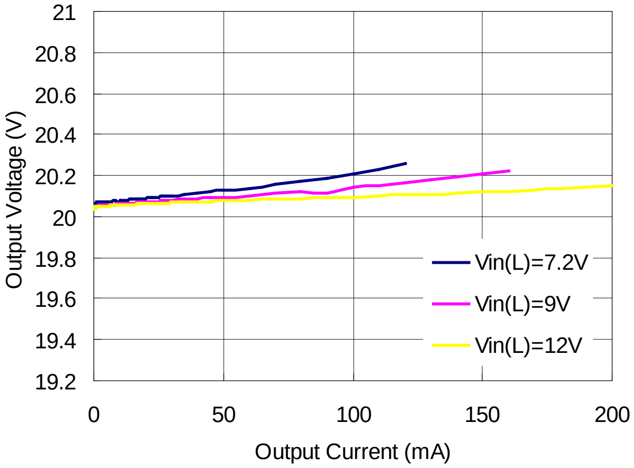


Typical Applications with Using 5.5V or Greater

V_{OUT}=15V, L=10μH (LQH32CN100K53)

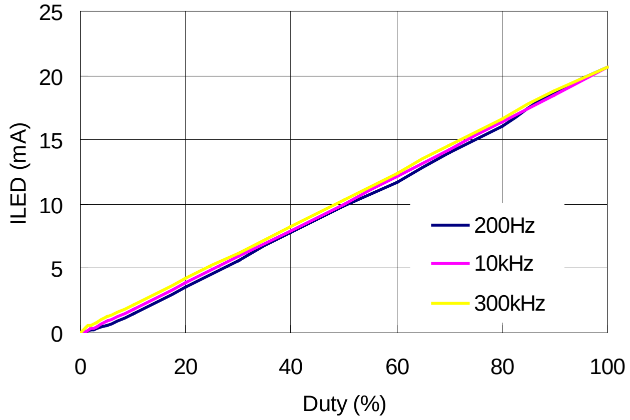


V_{OUT}=20V, L=10μH (LQH32CN100K53)



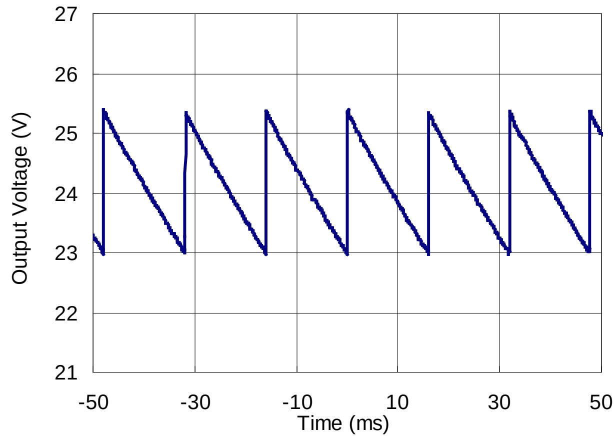
4) Maxduty vs. ILED

R1207N823B/C



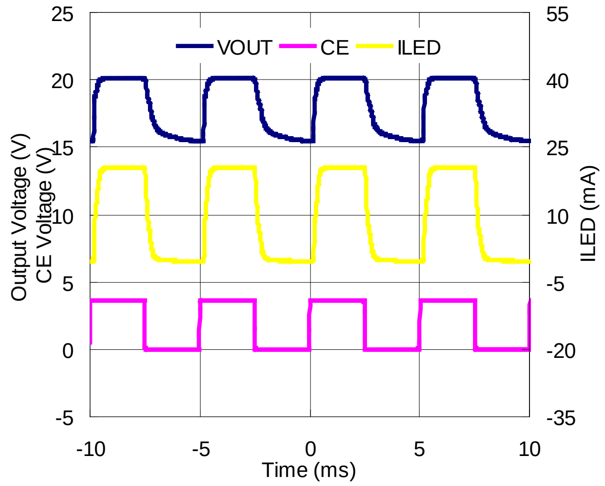
5) OVP Output Waveform

R1207N823B/C

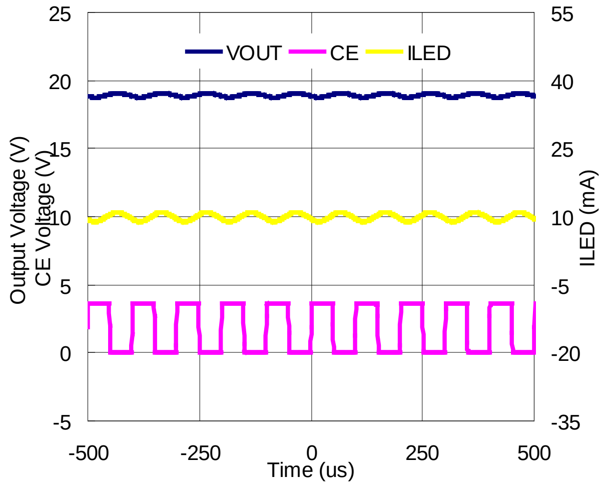


6) Waveform (6LED)

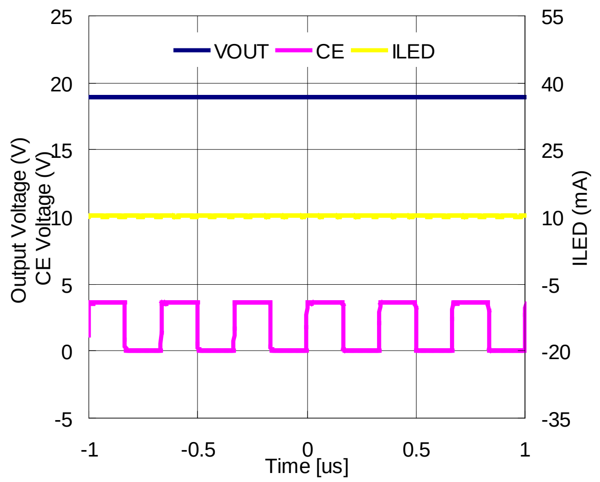
R1207N823B/C (CE Freq=200Hz)



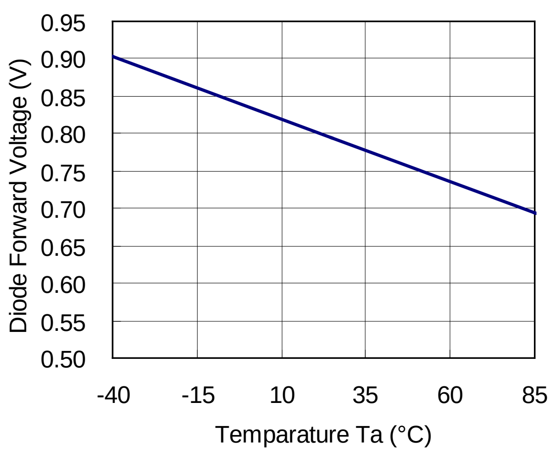
R1207N823B/C (CE Freq=10KHz)



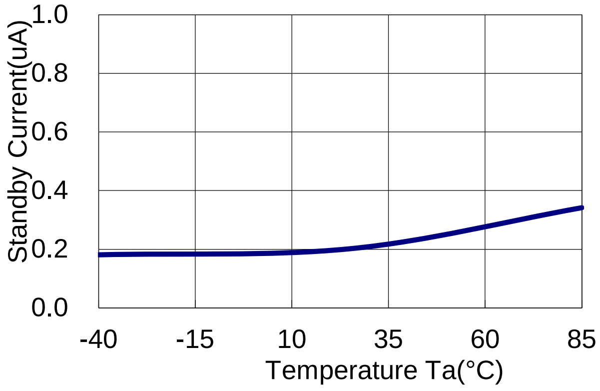
R1207N823B/C (CE Freq=300KHz)



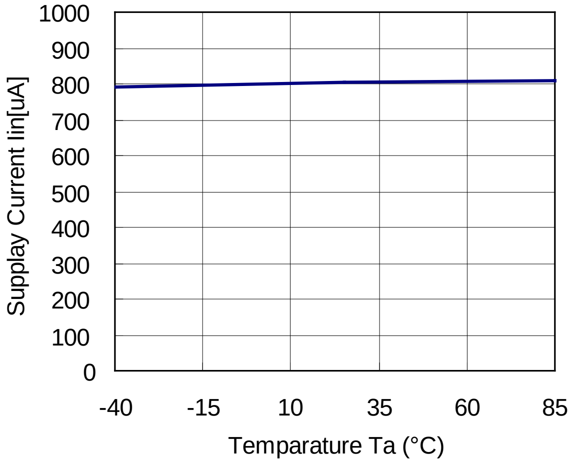
7) Diode Forward Voltage vs. Temperature



8) Standby Current vs. Temperature

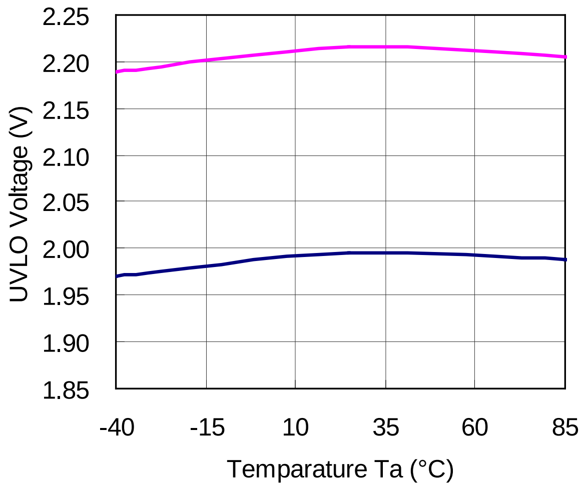


9) Supply Current vs. Temperature

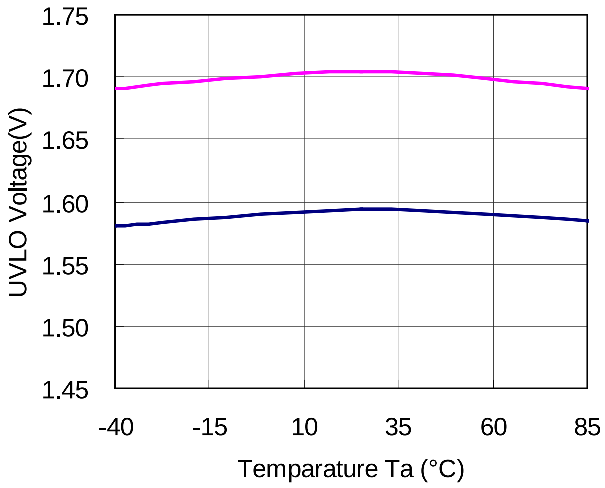


10) UVLO Output Voltage vs. Temperature

R1207N8xxA

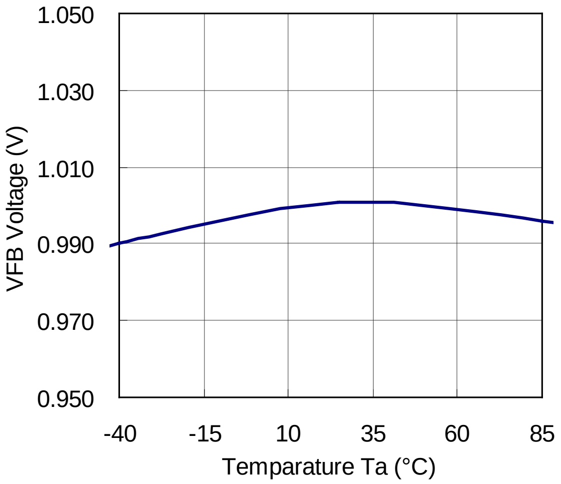


R1207N8xxB

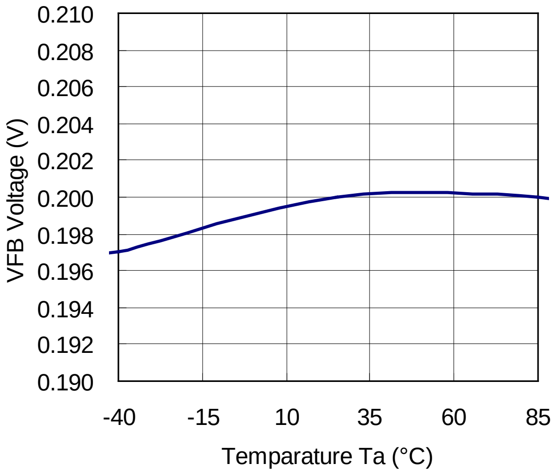


11) VFB Voltage vs. Temperature

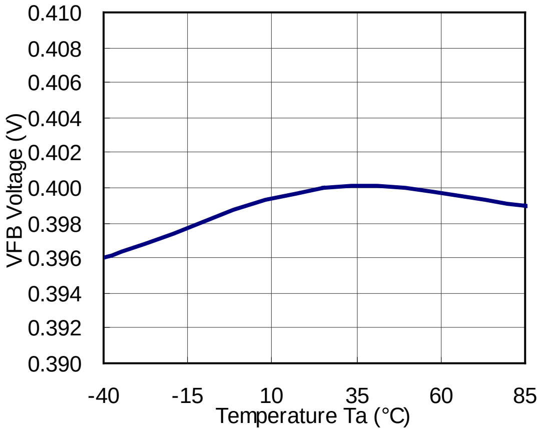
R1207N8xxA



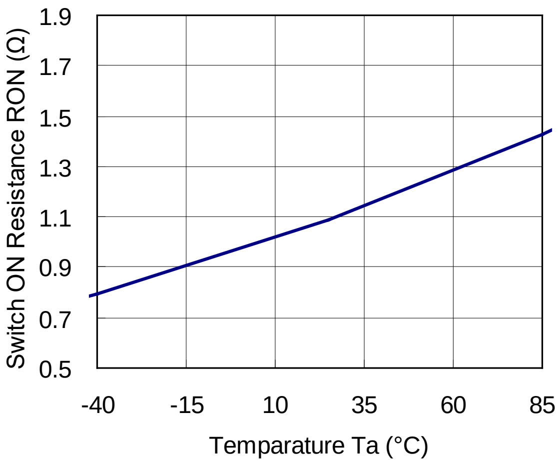
R1207N8xxB



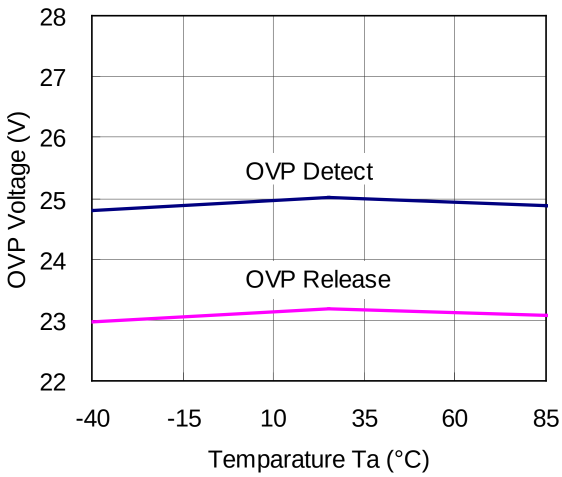
R1207N8xxC



12）Switch ON Resistance RON vs. Temperature

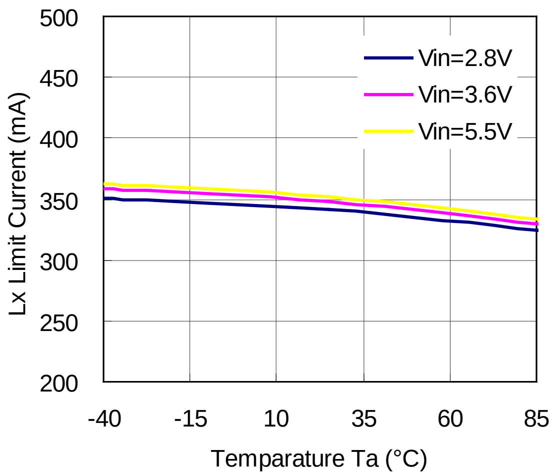


13）OVP Voltage vs. Temperature

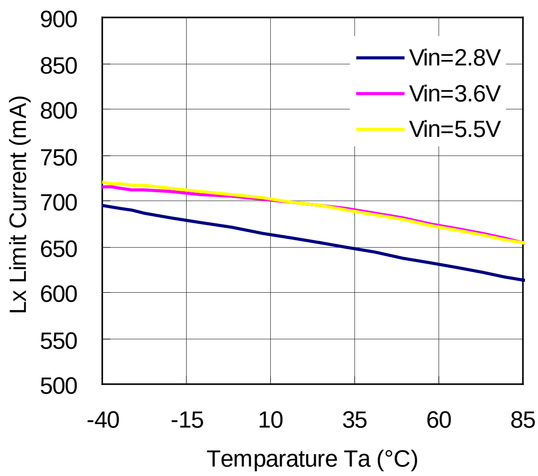


14）Lx Current Limit vs. Temperature

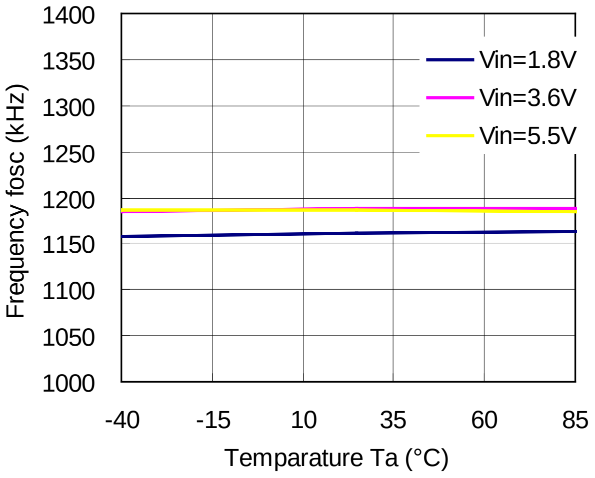
R1207N81xx



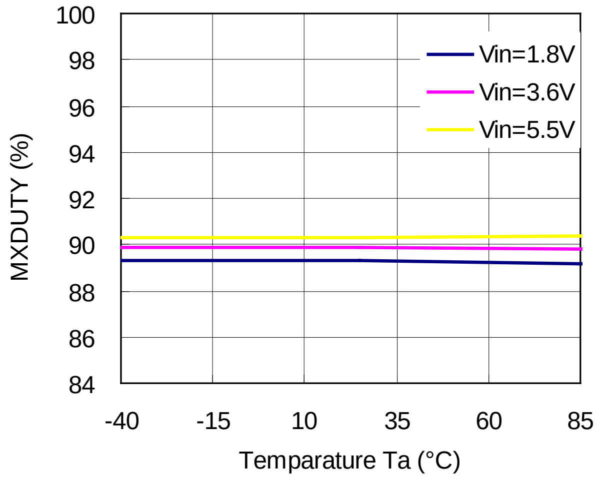
R1207N82xx



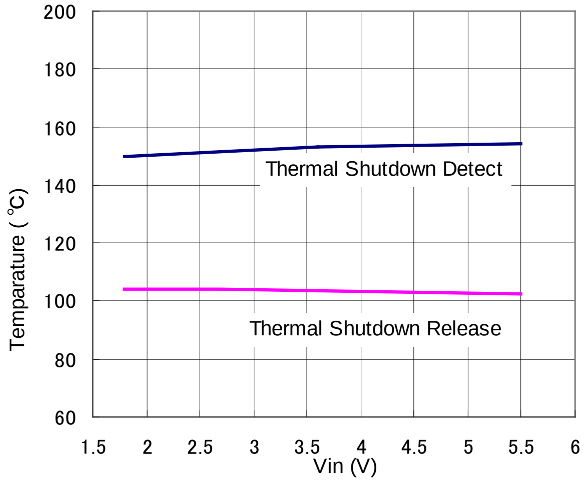
15) Oscillator Frequency vs. Temperature



16) Maxduty vs. Temperature



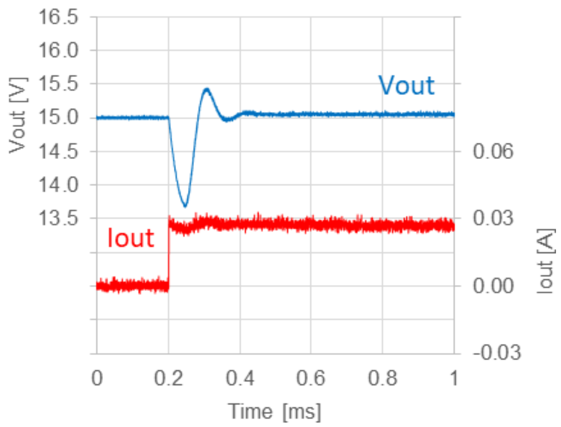
17) Thermal Shutdown Detect / Release Temperature vs. Input Voltage

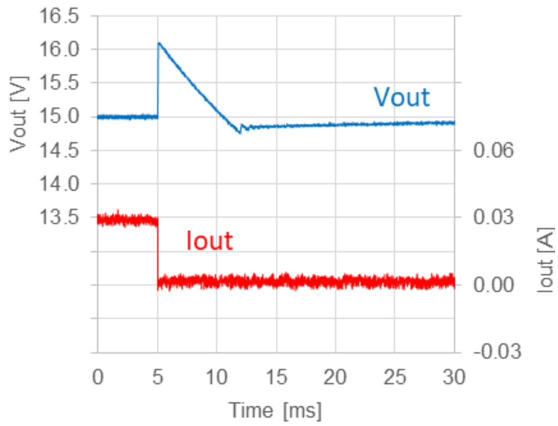


18) Load Transient Response

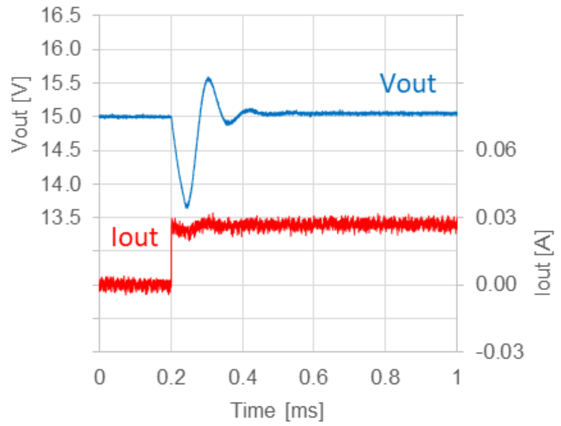
V_{IN} = 3.6 V, V_{OUT} = 15 V I_{OUT} = 0 mA ⇔ 30 mA

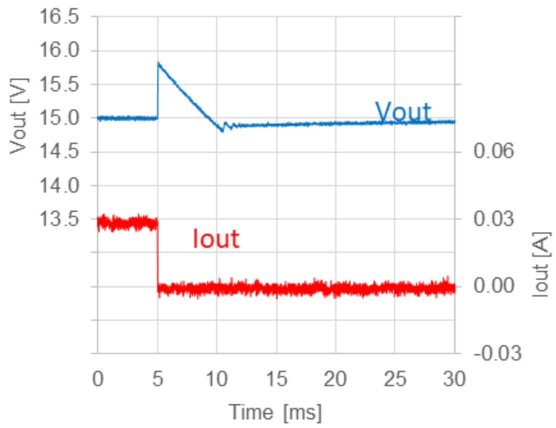
L = 10 µH Setting : Table 3-A



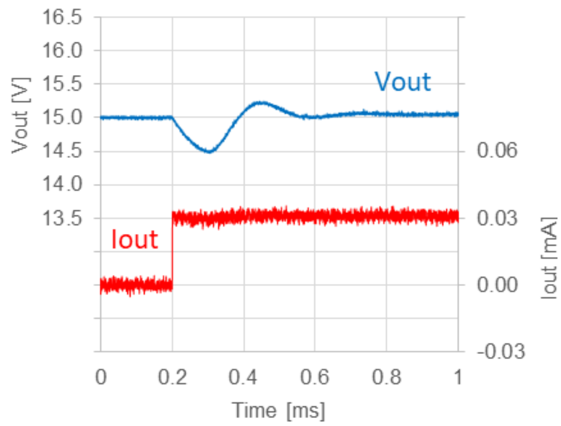


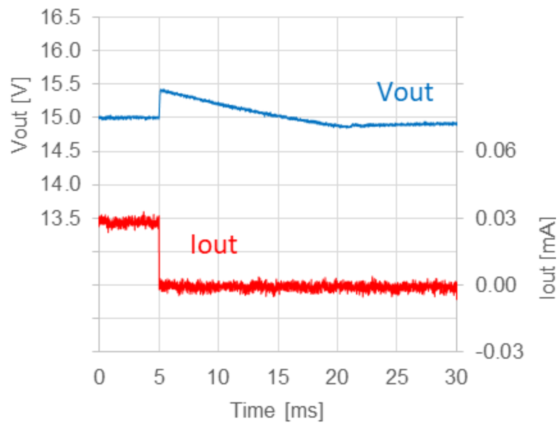
L = 22 µH Setting : Table 3-A



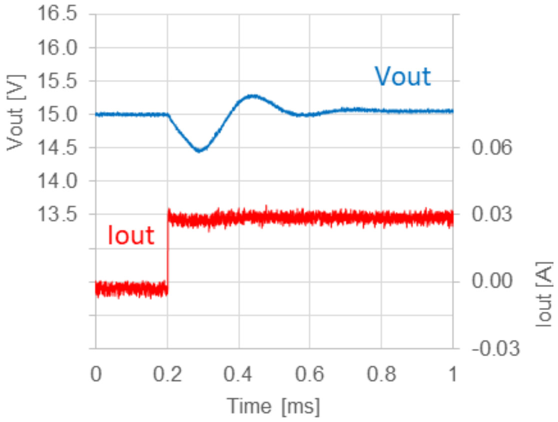


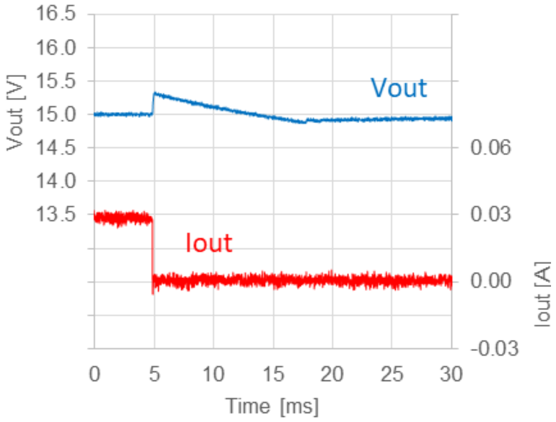
L =10 µH Setting : Table 3-B





L = 22 µH　Setting：Table 3-B





Ver. A

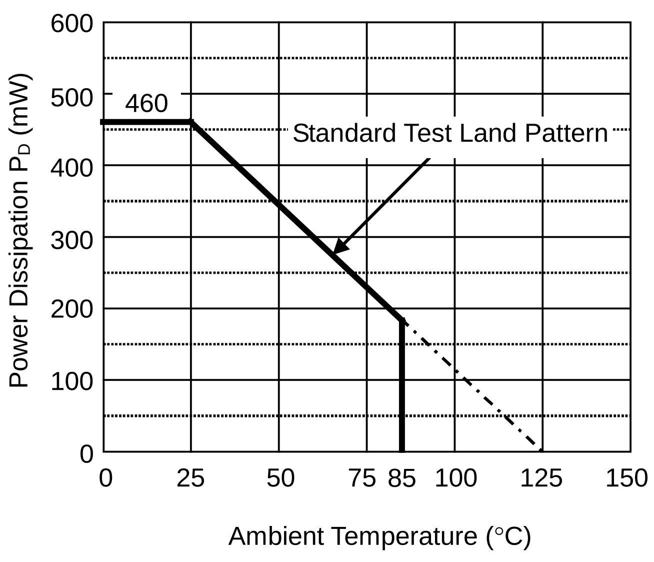
The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following conditions are used in this measurement.

Measurement Conditions

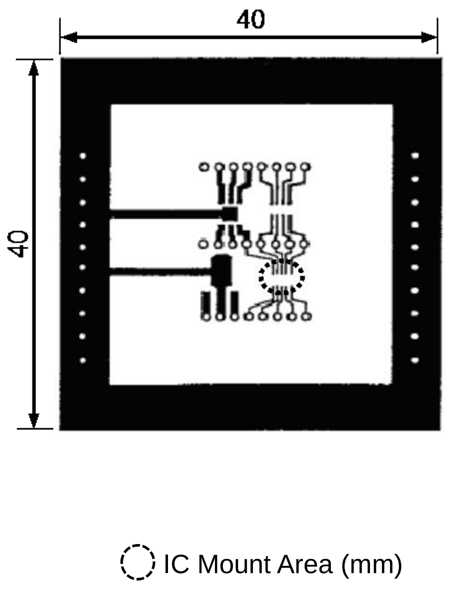
	Standard Test Land Pattern
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Double-Sided Board)
Board Dimensions	40 mm × 40 mm × 1.6 mm
Copper Ratio	Top Side: Approx. 50% Bottom Side: Approx. 50%
Through-holes	ϕ 0.5 mm × 44 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

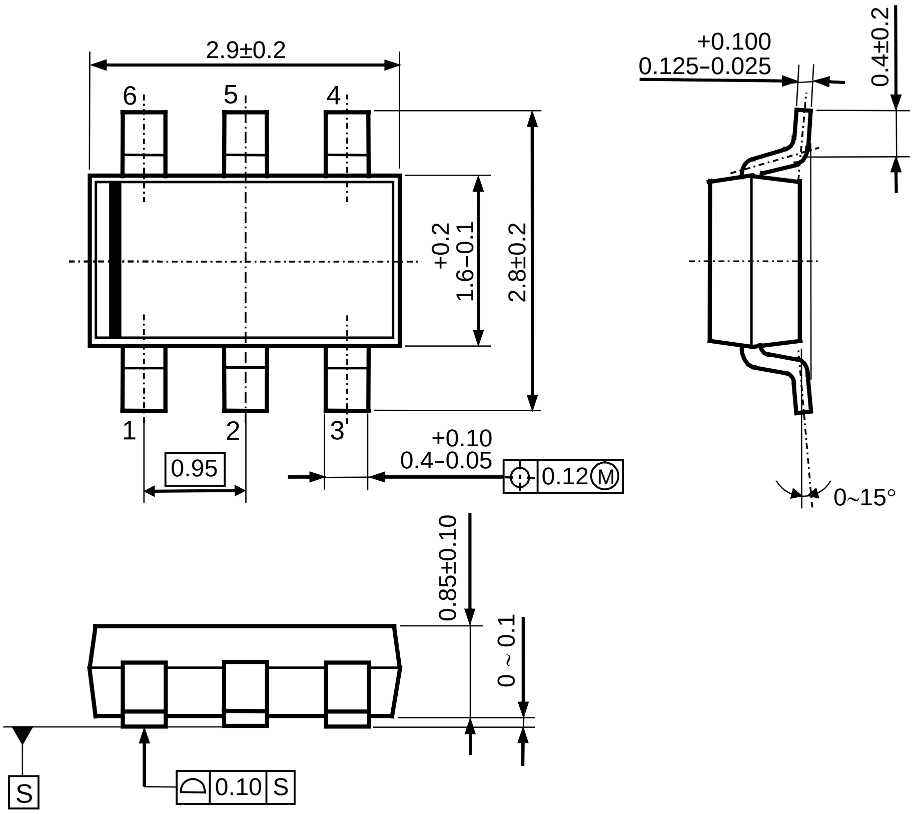
	Standard Test Land Pattern
Power Dissipation	460 mW
Thermal Resistance	$\theta ja = (125 - 25°C) / 0.46 W = 217°C/W$ $\theta jc = 40°C/W$



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern



TSOT-23-6 Package Dimensions (Unit: mm)

NISSHINBO

Nisshinbo Micro Devices Inc.

Official website

https://www.nisshinbo-microdevices.co.jp/en/

Purchase information

https://www.nisshinbo-microdevices.co.jp/en/buy/