XC6383 Series

PFM Controlled, Step-Up DC/DC Converters (Variable Duty Ratio)

◆Variable Duty Ratio : 55% / 75%
◆CMOS Low Power Consumption
◆Operating Voltage : 0.9V~10.0V
◆Output Voltage Range : 2.0V~7.0V
◆Output Voltage Accuracy : ±2.5%

■Applications

- ●Cellular phones, pagers
- ●Palmtops
- ●Cameras, video recorders
- ●Portable equipment

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■General Description

The XC6383 series is a group of PFM controlled step-up DC/DC converters. Unlike conventional PFMs, the XC6383 automatically switches duty ratio (55% / 75%) when it senses changes in load and can support both large and small currents.

The XC6383 series employs CMOS process and laser trimming technologies so as to attain low power and high accuracy.

Maximum oscillator frequency is trimmed to 100kHz (accuracy: ±15%).

Every built-in switching transistor type enables a step-up circuit to be configured using only three external components ; a coil, a diode, and a capacitor.

External transistor versions are available to accommodate high output current applications.

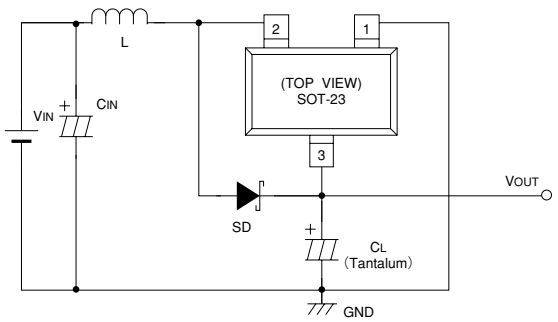
Both built-in and external transistor types include 5-pin and 3-pin packages, which are provided with either a CE (chip enable) function that reduces power comsumption during shut-down mode, or a V_{DD} pin function (separated power and voltage detect pins).

SOT-23, SOT-25, and SOT-89-5 ultra mini-mold packages.

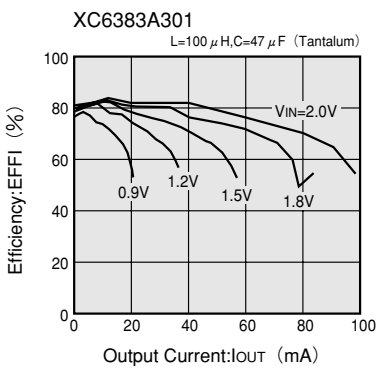
■Features

Operating (start-up) voltage range : 0.9V~10V
Output voltage range : 2.0V~7.0V in 0.1V increments
Highly accurate : Set-up voltage ±2.5%
Maximum oscillator frequency : 100kHz (±15%)
Variable Duty Ratio : 55% / 75% (±5%)
Both switching transistor built-in and external types are available
Five-lead packaged units offer either Chip Enable or independent V_{OUT} pin option.
Small package : SOT-23, 25 mini-mold (3-pin, 5-pin)
SOT-89, 89-5 mini-power mold (3-pin, 5-pin)

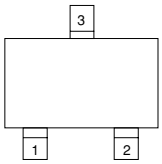
■Typical Application Circuit



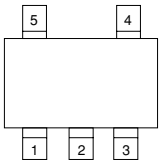
■Typical Performance Characteristic



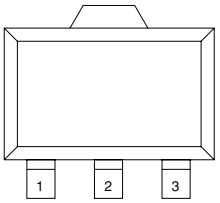
■Pin Configuration



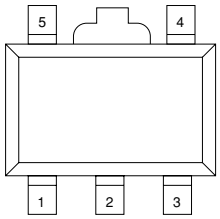
SOT-23
(TOP VIEW)



SOT-25
(TOP VIEW)



SOT-89
(TOP VIEW)



SOT-89-5
(TOP VIEW)

■Pin Assignment

(XC6383A, XC6383B)

PIN NUMBER				PIN NAME	FUNCTION
XC6383A		XC6383B			
SOT-23	SOT-89	SOT-23	SOT-89		
1	1	1	1	V_{SS}	Ground
3	2	3	2	V_{OUT}	Output voltage monitor, IC internal power supply
2	3	–	–	Lx	Switch
–	–	2	3	EXT	External switch transistor drive

(XC6383C, XC6383D)

PIN NUMBER				PIN NAME	FUNCTION
XC6383C		XC6383D			
SOT-25	SOT-89-5	SOT-25	SOT-89-5		
4	5	4	5	V_{SS}	Ground
2	2	2	2	V_{OUT}	Output voltage monitor, IC internal power supply
5	4	–	–	Lx	Switch
–	–	5	4	EXT	External switch transistor drive
1	3	1	3	CE	Chip enable
3	1	3	1	NC	No Connection

(XC6383E, XC6383F)

PIN NUMBER				PIN NAME	FUNCTION
XC6383E		XC6383F			
SOT-25	SOT-89-5	SOT-25	SOT-89-5		
4	5	4	5	V_{SS}	Ground
2	2	2	2	V_{DD}	IC internal power supply
5	4	–	–	Lx	Switch
–	–	5	4	EXT	External switch transistor drive
1	3	1	3	V_{OUT}	Output voltage monitor
3	1	3	1	NC	No Connection

■Product Classification

●Selection Guide

PART TYPE	DUTY RATIO	PACKAGE	SWITCHING RELATED	ADDITIONAL FUNCTION	FEATURES
XC6383A	Switchable	SOT-23, SOT-89	Built-in Transistor "Lx" lead	——	• Automatic duty ratio switch. • Low ripple and highly efficient from low current to high current.
XC6383B	Switchable	SOT-23, SOT-89	External Transistor "EXT" lead	——	• Automatic duty ratio switch. • Adding an external transistor can improve the output capability by up to several hundred mA.
XC6383C	Switchable	SOT-25, SOT-89-5	Built-in Transistor "Lx" lead	Chip Enable(CE)	• Stand-by (CE) function added version to the XC6383A. • Stand-by current: 0.5μA max.
XC6383D	Switchable	SOT-25, SOT-89-5	External Transistor "EXT" lead	Chip Enable(CE)	• Stand-by (CE) function added version to the XC6383B. • Stand-by current: 0.5μA max.
XC6383E	Switchable	SOT-25, SOT-89-5	Built-in Transistor "Lx" lead	Separated "V_{DD}" and "V_{OUT}" leads	• Independent power supply and set-up voltage sensing leads allow designing of PFM controllers.
XC6383F	Switchable	SOT-25, SOT-89-5	External Transistor "EXT" lead	Separated "V_{DD}" and "V_{OUT}" leads	• Independent power supply and set-up voltage sensing leads allow designing of PFM controllers.

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●Ordering Information

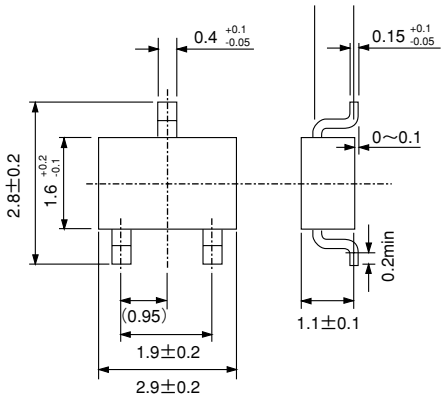
XC6383①②③④⑤⑥

XC6383 series PFM Controlled 2 Step

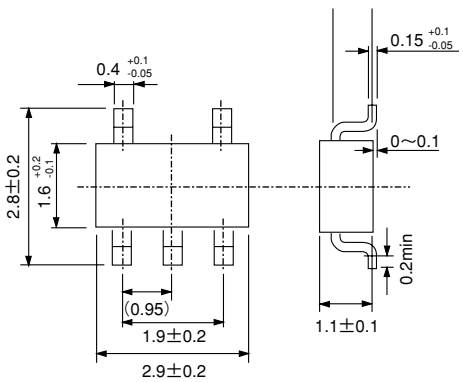
①	A	3-pin. Built-in switching transistor		
	B	3-pin. External switching transistor		
	C	Stand-by capability. (5-pin) Built-in switching transistor		
	D	Stand-by capability. (5-pin) External switching transistor		
	E	Separated V_{DD} and V_{OUT}. (5-pin) Built-in switching transistor		
	F	Separated V_{DD} and V_{OUT}. (5-pin) External switching transistor		
② ③	Output Voltage e.g.V_{OUT}=3.5V ➔ ②=3 ③=5			
④	1	Maximum Oscillator Frequency 100kHz		
⑤	M	Package	①=A~B ①=C~F	SOT-23 SOT-25
	P	Package	①=A~B ①=C~F	SOT-89 SOT-89-5
⑥	R	Embossed tape: Standard Feed		
	L	Embossed tape: Reverse Feed		

■Packaging Information

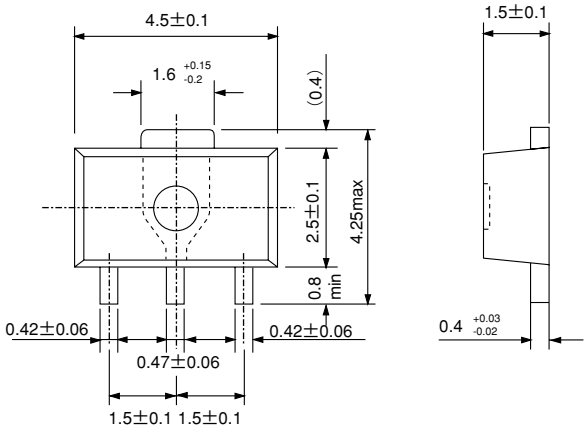
●SOT-23



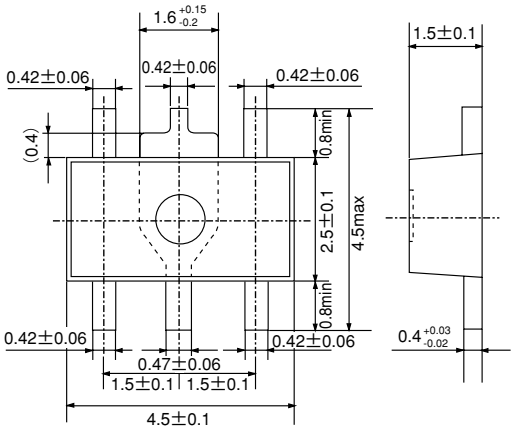
●SOT-25



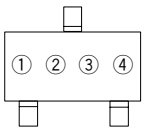
●SOT-89



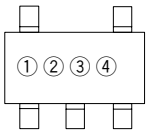
●SOT-89-5



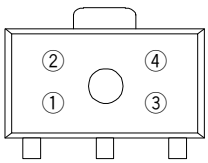
■Marking



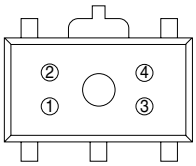
SOT-23
(TOP VIEW)



SOT-25
(TOP VIEW)



SOT-89
(TOP VIEW)



SOT-89-5
(TOP VIEW)

① Represents the Product Classification

DESIGNATOR	FUNCTION		PRODUCT NAME
$\overline{H}$	—	Built-in Transistor	XC6383A＊＊＊＊＊
$\overline{K}$	—	External Transistor	XC6383B＊＊＊＊＊
$\overline{R}$	CE	Built-in Transistor	XC6383C＊＊＊＊＊
$\overline{T}$	CE	External Transistor	XC6383D＊＊＊＊＊
$\overline{U}$	VDD/VIN	Built-in Transistor	XC6383E＊＊＊＊＊
$\overline{V}$	VDD/VIN	External Transistor	XC6383F＊＊＊＊＊

② Represents the integer of the Output Voltage and Oscillator Frequency

INTEGER OF THE OUTPUT VOLTAGE	OSCILLATOR FREQUENCY(kHz)
	100
1	1
2	2
3	3
4	4
5	5
6	6
7	7

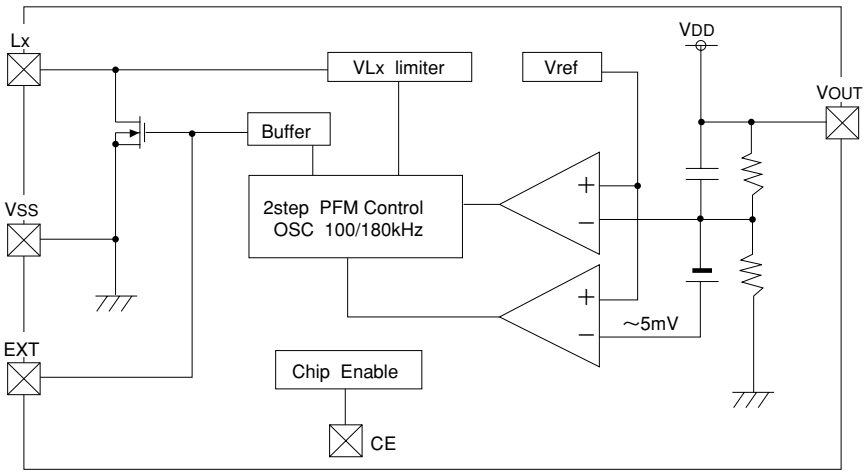
③ Represents the decimal number of the Output Voltage and Oscillator Frequency

OUTPUT VOLTAGE	OSCILLATOR FREQUENCY(kHz)
	100
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

④ Denotes the production lot number
0 to 9, A to Z repeated(G.I.J.O.Q.W excepted)

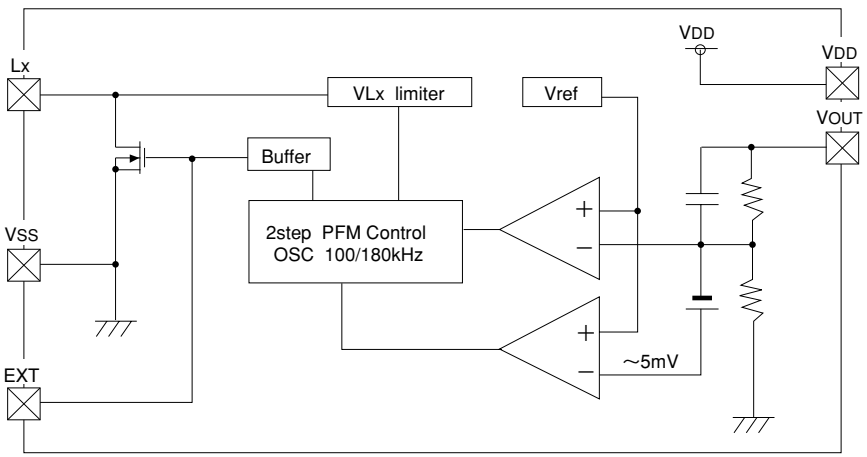
■Block Diagram

●XC6383A~XC6383D (V_{DD} is internally connected to the V_{OUT} pin.)



Note: Built-in Tr. types use the Lx pin, external Tr types use the EXT pin.
The CE pin is only used with the XC6381C and XC6381D.

●XC6383E and XC6383F



Note: The V_{DD} pin is only used with the XC6383E and XC6383F.
Built-in Tr types use the Lx pin, external Tr types use the EXT pin.

■Absolute Maximum Ratings

Ta=25°C

PARAMETER		SYMBOL	RATINGS	UNITS
V_{OUT} Input Voltage		V_{OUT}	12	V
Lx pin Voltage		V_{Lx}	12	V
Lx pin Current		I_{Lx}	400	mA
EXT pin Voltage		V_{EXT}	V_{SS}–0.3 ~ V_{OUT}+0.3	V
EXT pin Current		I_{EXT}	±50	mA
CE Input Voltage		V_{CE}	12	V
V_{DD} Input Voltage		V_{DD}	12	V
Continuous Total Power Dissipation	SOT-23	Pd	150	mW
	SOT-89		500	
Operating Ambient Temperature		Topr	–30 ~ +80	°C
Storage Temperature		Tstg	–40 ~ +125	°C

■Electrical Characteristics

XC6383A301MR V_{OUT}=3.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L etc. connected	2.925	3.000	3.075	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
No-Load Input Current	I_{IN}	I_{OUT}=0mA(Note1)		4.6	9.3	μA
Supply Current 1(Note2)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		19.7	39.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5		2.1	4.2	μA
Lx Switch-On Resistance	R_{SWON}	Same as I_{DD1}. VLx=0.4V.		5.2	7.9	Ω
Lx Leakage Current	I_{LXL}	No external components.V_{OUT}=VLx=10V.			1.0	μA
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of Lxg waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of Lx on-time	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty	153	180	207	kHz
Lx Limit Voltage	VLxLMT	Same as I_{DD}. F_{OSC}>MAXF_{OSC1} × 2	0.7		1.1	V
Efficiency	EFFI	L, SD, C_L etc. connected		80		%

Measuring conditions: Unless otherwise specified, V_{IN}=V_{OUT} × 0.6, I_{OUT}=30mA. See Typical Application Circuits, Fig.1.

Note: 1. The Schottky diode (SD) must be type MA2Q735, with reverse current (I_R) < 1.0μA at reverse voltage (V_R)=10.0V
2. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

XC6383A501MR V_{OUT}=5.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L etc. connected	4.875	5.000	5.125	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
No-Load Input Current	I_{IN}	I_{OUT}=0mA(Note1)		5.3	10.6	μA
Supply Current 1(Note2)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		31.7	63.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5V		2.4	4.8	μA
Lx Switch-On Resistance	R_{SWON}	Same as I_{DD1}. VLx=0.4V.		2.8	4.3	Ω
Lx Leakage Current	I_{LXL}	No external components. V_{OUT}=VLx=10V.			1.0	μA
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of Lx waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of Lx on-time	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153	180	207	kHz
Lx Limit Voltage	VLxLMT	Same as I_{DD1}. F_{OSC}>MAXF_{OSC1} × 2	0.7		1.1	V
Efficiency	EFFI	L, SD, C_L etc. connected		85		%

Measuring conditions: Unless otherwise specified, V_{IN}=V_{OUT} × 0.6, I_{OUT}=50mA. See Typical Application Circuits, Fig.1.

Note: 1. The Schottky diode (SD) must be type MA2Q735, with reverse current (IR) < 1.0μA at reverse voltage (VR)=10.0V
2. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

XC6383B301MR V_{OUT}=3.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L, Tr., etc. connected	2.925	3.000	3.075	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
Supply Current 1(Note 1)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		19.7	39.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5V		2.1	4.2	μA
EXT "High" On Resistance	R_{EXTH}	Same as I_{DD1}. V_{EXT} =V_{OUT}–0.4V.		76	114	Ω
EXT "Low" On Resistance	R_{EXTL}	Same as I_{DD1}. V_{EXT}=0.4V.		76	114	Ω
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of EXT waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of EXT on-time.	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153	180	207	kHz
Efficiency	EFFI	L, SD, C_L, Tr., etc. connected		80		%

Measuring conditions: Unless otherwise specified, V_{IN}=V_{OUT} × 0.6, I_{OUT}=30mA. See Typical Application Circuits, Fig.2.

Note: 1. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption.

XC6383B501MR V_{OUT}=5.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L, Tr., etc. connected	4.875	5.000	5.125	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
Supply Current 1(Note 1)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		31.7	63.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5V		2.4	4.8	μA
EXT "High" On Resistance	R_{EXTH}	Same as I_{DD1}. VEXT =V_{OUT}–0.4V.		50	75	Ω
EXT "Low" On Resistance	R_{EXTL}	Same as I_{DD1}. VEXT=0.4V.		50	75	Ω
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of EXT waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of EXT on-time.	55	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153	180	207	kHz
Efficiency	EFFI	L, SD, C_L, Tr., etc. connected		85		%

Measuring conditions: Unless otherwise specified, V_{IN}=V_{OUT} × 0.6, I_{OUT}=50mA. See Typical Application Circuits, Fig.2.

Note: 1. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption.

XC6383C301MR V_{OUT}=3.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L etc. connected	2.925	3.000	3.075	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
No-Load Input Current	I_{IN}	I_{OUT}=0mA(Note1)		4.6	9.3	μA
Supply Current 1(Note2)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		19.7	39.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5V		2.1	4.2	μA
Lx Switch-On Resistance	R_{SWON}	Same as I_{DD1}. V_{LX}=0.4V.		5.2	7.9	Ω
Lx Leakage Current	ILxL	No external components. V_{OUT}=V_{LX}=10V.			1.0	μA
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of Lx waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of Lx on-time.	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty	153	180	207	kHz
Stand-by Current	I_{STB}	Same as I_{DD1}.			0.5	μA
CE "High" Voltage	V_{CEH}	Same as I_{DD1}. Existence of Lx Oscillation.	0.75			V
CE "Low" Voltage	V_{CEL}	Same as I_{DD1}. Disappearance of Lx Oscillation.			0.20	V
CE "High" Current	I_{CEH}	Same as I_{DD1}. V_{CE}=V_{OUT} × 0.95.			0.25	μA
CE "Low" Current	I_{CEL}	Same as I_{DD1}. V_{CE}=0V.			–0.25	μA
Lx Limit Voltage	VLxLMT	Same as I_{DD1}. F_{OSC}>MAXF_{OSC1} × 2	0.7		1.1	V
Efficiency	EFFI	L, SD, C_L etc. connected		80		%

Measuring conditions: Unless otherwise specified, connect CE to V_{OUT}, V_{IN}=V_{OUT} × 0.6, I_{OUT}=30mA. See Typical Application Circuits, Fig.3.

Note: 1. The Schottky diode (SD) must be type MA2Q735, with reverse current (I_R) < 1.0μA at reverse voltage (V_R)=10.0V
2. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

XC6383C501MR V_{OUT}=5.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L etc. connected	4.875	5.000	5.125	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
No-Load Input Current	I_{IN}	I_{OUT}=0mA(Note1)		5.3	10.6	μA
Supply Current 1(Note2)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		31.7	63.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5V		2.4	4.8	μA
Lx Switch-On Resistance	R_{SWON}	Same as I_{DD1}. V_{LX}=0.4V.		2.8	4.3	Ω
Lx Leakage Current	ILxL	No external components. V_{OUT}=V_{LX}=10V.			1.0	μA
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of Lx waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of Lx on-time.	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153	180	207	kHz
Stand-by Current	I_{STB}	Same as I_{DD1}.			0.5	μA
CE "High" Voltage	V_{CEH}	Same as I_{DD1}. Existence of Lx Oscillation.	0.75			V
CE "Low" Voltage	V_{CEL}	Same as I_{DD1}. Disappearance of Lx Oscillation.			0.20	V
CE "High" Current	I_{CEH}	Same as I_{DD1}. V_{CE}=V_{OUT} × 0.95.			0.25	μA
CE "Low" Current	I_{CEL}	Same as I_{DD1}.V_{CE}=0V.			–0.25	μA
Lx Limit Voltage	VLxLMT	Same as I_{DD1}. F_{OSC}>MAXF_{OSC1} × 2	0.7		1.1	V
Efficiency	EFFI	L, SD, C_L etc. connected		85		%

Measuring conditions: Unless otherwise specified, connect CE to V_{OUT}, V_{IN}=V_{OUT} × 0.6, I_{OUT}=50mA. See Typical Application Circuits, Fig.3.

Note: 1. The Schottky diode (SD) must be type MA2Q735, with reverse current (I_R) < 1.0μA at reverse voltage (V_R)=10.0V
2. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

XC6383D301MR V_{OUT}=3.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L,Tr., etc. connected	2.925	3.000	3.075	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
Supply Current 1(Note1)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		19.7	39.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT+}0.5V		2.1	4.2	μA
EXT "High" On Resistance	R_{EXTH}	Same as I_{DD1}. V_{EXT}=V_{OUT}–0.4V.		76	114	Ω
EXT "Low" On Resistance	R_{EXTL}	Same as I_{DD1}. V_{EXT}=4.0V.		76	114	Ω
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of EXT waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of EXT on-time	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153	180	207	kHz
Stand-by Current	I_{STB}	Same as I_{DD1}.			0.5	μA
CE "High" Voltage	V_{CEH}	Same as I_{DD1}. Existence of EXT Oscillation.	0.75			V
CE "Low" Voltage	V_{CEL}	Same as I_{DD1}. Disappearance of EXT Oscillation.			0.20	V
CE "High" Current	I_{CEH}	Same as I_{DD1}.V_{CE}=V_{OUT} × 0.95.			0.25	μA
CE "Low" Current	I_{CEL}	Same as I_{DD1}.V_{CE}=0V.			–0.25	μA
Efficiency	EFFI	L, SD, C_L,Tr., etc. connected		80		%

Measuring conditions: Unless otherwise specified, connect CE to V_{OUT}, V_{IN}=V_{OUT} × 0.6, I_{OUT}=30mA. See Typical Application Circuits, Fig.4.

Note: 1."Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

XC6383D501MR V_{OUT}=5.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L,Tr., etc. connected	4.875	5.000	5.125	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
Supply Current 1(Note1)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		31.7	63.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT+}0.5V		2.4	4.8	μA
EXT "High" On Resistance	R_{EXTH}	Same as I_{DD1}. V_{EXT}=V_{OUT}–0.4V.		50	75	Ω
EXT "Low" On Resistance	R_{EXTL}	Same as I_{DD1}. V_{EXT}=4.0V.		50	75	Ω
Duty Ratio 1	DTY1	Same as I_{DD1}. Measuring of EXT waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of EXT on-time	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153	180	207	kHz
Stand-by Current	I_{STB}	Same as I_{DD1}.			0.5	μA
CE "High" Voltage	V_{CEH}	Same as I_{DD1}. Existence of EXT Oscillation.	0.75			V
CE "Low" Voltage	V_{CEL}	Same as I_{DD1}. Disappearance of EXT Oscillation.			0.20	V
CE "High" Current	I_{CEH}	Same as I_{DD1}.V_{CE}=V_{OUT} × 0.95.			0.25	μA
CE "Low" Current	I_{CEL}	Same as I_{DD1}.V_{CE}=0V.			–0.25	μA
Efficiency	EFFI	L, SD, C_L,Tr., etc. connected		85		%

Measuring conditions: Unless otherwise specified, connect CE to V_{OUT}, V_{IN}=V_{OUT} × 0.6, I_{OUT}=50mA. See Typical Application Circuits, Fig.4.

Note: 1."Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

XC6383E301MR V_{OUT}=3.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L etc. connected	2.925	3.000	3.075	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA.		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA.	0.70			V
No-Load Input Current	V_{IN}	I_{OUT}=0mA(Note 1)		4.6	9.3	μA
Supply Current 1(Note2)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		19.7	39.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5V		2.1	4.2	μA
Lx Switch-On Resistance	R_{SWON}	Same as I_{DD1}. VLx=0.4V.		5.2	7.9	Ω
Lx Leakage Current	ILxL	No external components.V_{OUT}=VLx=10V.			1.0	μA
Duty Ratio 1	DTY1	Same as I_{DD1} Measuring of Lx waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of Lx on-time	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153	180	207	kHz
Lx Limit Voltage	VLxLMT	Same as I_{DD1}. F_{OSC}>MAXF_{OSC} × 2	0.7		1.1	V
Efficiency	EFFI	L, SD, C_L etc. connected		80		%

Measuring conditions: Unless otherwise specified, connect V_{DD} to V_{OUT}, V_{IN}=V_{OUT} × 0.6, I_{OUT}=30mA. See Typical Application Circuits, Fig.5.

Note: 1. The Schottky diode (SD) must be type MA2Q735, with reverse current (I_R) < 1.0μA at reverse voltage (V_R)=10.0V.

2. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

* When the V_{DD} and V_{OUT} pins are independently used, the voltage range at the V_{DD} pin should be 2.2V to 10V. The IC operates from V_{DD}=0.8V. However, output voltage and oscillator frequency are properly stabilized when V_{DD}=2.2V or higher.

XC6383E501MR V_{OUT}=5.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L etc. connected	4.875	5.000	5.125	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA.		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA.	0.70			V
No-Load Input Current	I_{IN}	I_{OUT}=0mA(Note 1)		5.3	10.6	μA
Supply Current 1(Note2)	I_{DD1}	V_{IN}=V_{OUT} × 0.95		31.7	63.4	μA
Supply Current 2	I_{DD2}	V_{IN}=V_{OUT}+0.5V		2.4	4.8	μA
Lx Switch-On Resistance	R_{SWON}	Same as I_{DD1}. VLx=0.4V.		2.8	4.3	Ω
Lx Leakage Current	ILxL	No external components.V_{OUT}=VLx=10V.			1.0	μA
Duty Ratio 1	DTY1	Same as I_{DD1} Measuring of Lx waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of Lx on-time	50	55	60	%
Maximum Oscillation Frequency1	MAX F_{OSC1}	Same as I_{DD1}. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX F_{OSC2}	Same as I_{DD1}. 55% duty.	153		207	kHz
Lx Limit Voltage	VLxLMT	Same as I_{DD1}. F_{OSC}>MAXF_{OSC} × 2	0.7		1.1	V
Efficiency	EFFI	L, SD, C_L etc. connected		85		%

Measuring conditions: Unless otherwise specified, connect V_{DD} to V_{OUT}, V_{IN}=V_{OUT} × 0.6, I_{OUT}=50mA. See Typical Application Circuits, Fig.5.

Note: 1. The Schottky diode (SD) must be type MA2Q735, with reverse current (I_R) < 1.0μA at reverse voltage (V_R)=10.0V.

2. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption. The current actually provided by an external V_{IN} source is represented by "No-Load Input Current (I_{IN})".

* When the V_{DD} and V_{OUT} pins are independently used, the voltage range at the V_{DD} pin should be 2.2V to 10V. The IC operates from V_{DD}=0.8V. However, output voltage and oscillator frequency are properly stabilized when V_{DD}=2.2V or higher.

XC6383F301MR V_{OUT}=3.0V Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L,Tr., etc. connected	2.925	3.000	3.075	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
Supply Current 1(Note1)	$I_{DD}1$	$V_{IN}=V_{OUT} \times 0.95$		19.7	39.4	μA
Supply Current 2	$I_{DD}2$	$V_{IN}=V_{OUT+}0.5V$		2.1	4.2	μA
EXT "High" On Resistance	R_{EXTH}	Same as $I_{DD}1$. $V_{EXT}=V_{OUT}-0.4V$.		76	114	Ω
EXT "Low" On Resistance	R_{EXTL}	Same as $I_{DD}1$. V_{EXT}=0.4V.		76	114	Ω
Duty Ratio 1	DTY1	Same as $I_{DD}1$ Measuring of EXT waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of EXT on-time.	50	55	60	%
Maximum Oscillation Frequency1	MAX $F_{OSC}1$	Same as $I_{DD}1$. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX $F_{OSC}2$	Same as $I_{DD}1$. 55% duty.	153	180	207	kHz
Efficiency	EFFI	L, SD, C_L,Tr., etc. connected		80		%

Measuring conditions: Unless otherwise specified, connect V_{DD} to V_{OUT}, $V_{IN}=V_{OUT} \times 0.6$, I_{OUT}=30mA. See Typical Application Circuits, Fig.6.

Note: 1. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption.

* When the V_{DD} and V_{OUT} pins are independently used, the voltage range at the V_{DD} pin should be 2.2V to 10V. The IC operates from V_{DD}=0.8V. However, output voltage and oscillator frequency are properly stabilized when V_{DD}=2.2V or higher.

XC6383F501MR V_{OUT}=5.0V Ta=25°C

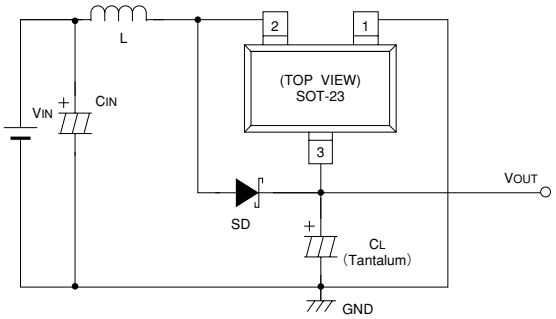
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	L, SD, C_L,Tr., etc. connected	4.875	5.000	5.125	V
Maximum Input Voltage	V_{IN}		10			V
Oscillation Start-up Voltage	V_{ST}	I_{OUT}=1mA		0.80	0.90	V
Oscillation Hold Voltage	V_{HLD}	I_{OUT}=1mA	0.70			V
Supply Current 1(Note1)	$I_{DD}1$	$V_{IN}=V_{OUT} \times 0.95$		31.7	63.4	μA
Supply Current 2	$I_{DD}2$	$V_{IN}=V_{OUT+}0.5V$		2.4	4.9	μA
EXT "High" On Resistance	R_{EXTH}	Same as $I_{DD}1$. $V_{EXT}=V_{OUT}-0.4V$.		50	75	Ω
EXT "Low" On Resistance	R_{EXTL}	Same as $I_{DD}1$. V_{EXT}=0.4V.		50	75	Ω
Duty Ratio 1	DTY1	Same as $I_{DD}1$ Measuring of EXT waveform.	70	75	80	%
Duty Ratio 2	DTY2	I_{OUT}=1mA. Measuring of EXT on-time.	50	55	60	%
Maximum Oscillation Frequency1	MAX $F_{OSC}1$	Same as $I_{DD}1$. 75% duty.	85	100	115	kHz
Maximum Oscillation Frequency2	MAX $F_{OSC}2$	Same as $I_{DD}1$. 55% duty.	153	180	207	kHz
Efficiency	EFFI	L, SD, C_L,Tr., etc. connected		85		%

Measuring conditions: Unless otherwise specified, connect V_{DD} to V_{OUT}, $V_{IN}=V_{OUT} \times 0.6$, I_{OUT}=50mA. See Typical Application Circuits, Fig.6.

Note: 1. "Supply Current 1" is the supply current while the oscillator is continuously oscillating. In actual operation the oscillator periodically operates which results in less average power consumption.

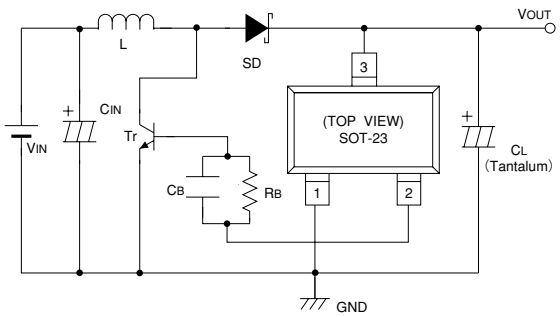
* When the V_{DD} and V_{OUT} pins are independently used, the voltage range at the V_{DD} pin should be 2.2V to 10V. The IC operates from V_{DD}=0.8V. However, output voltage and oscillator frequency are properly stabilized when V_{DD}=2.2V or higher.

■Typical Application Circuits



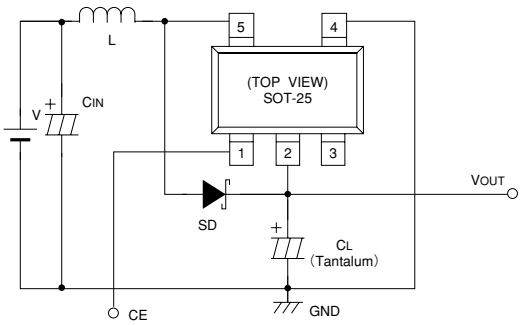
L : 100μH (SUMIDA, CR-54)
SD : MA2Q735 (Schottky diode; MATSUSHITA)
CL : 16V 47μF (Tantalum capacitor, NICHICON, MCE)
CIN : 16V 220μF (Aluminium Electrolytic Capacitor)

Fig.1 XC6383A Application



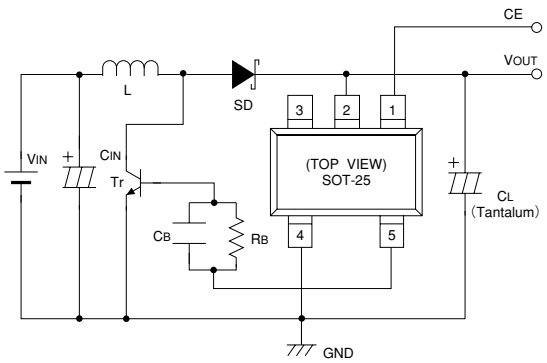
L : 47μH (SUMIDA, CR-54)
SD : MA2Q735 (Schottky diode; MATSUSHITA)
CL : 16V 47μF (Tantalum capacitor, NICHICON, MCE)
CIN : 16V 220μF (Aluminium Electrolytic Capacitor)
RB : 1kΩ, CB: 3300pF
Tr : 2SC3279, 2SD1628G

Fig.2 XC6383B Application



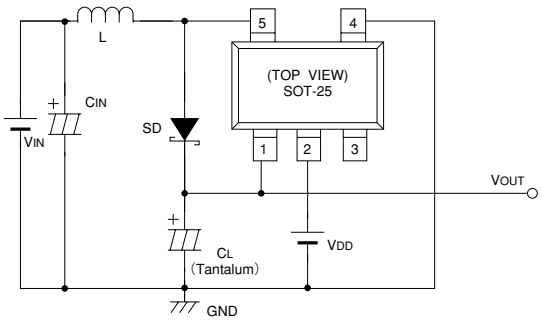
L : 100μH (SUMIDA, CR-54)
SD : MA2Q735 (Schottky diode; MATSUSHITA)
CL : 16V 47μF (Tantalum capacitor, NICHICON, MCE)
CIN : 16V 220μF (Aluminium Electrolytic Capacitor)

Fig.3 XC6383C Application



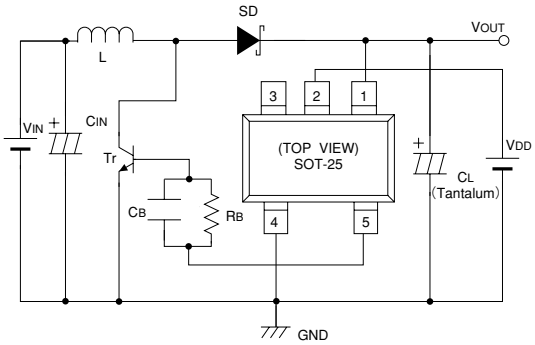
L : 47μH (SUMIDA, CR-54)
SD : MA2Q735 (Schottky diode; MATSUSHITA)
CL : 16V 47μF (Tantalum capacitor, NICHICON, MCE)
CIN : 16V 220μF (Aluminium Electrolytic Capacitor)
RB : 1kΩ, CB:3300pF
Tr : 2SC3279, 2SD1628G

Fig.4 XC6383D Application



L : 100μH (SUMIDA, CR-54)
SD : MA2Q735 (Schottky diode; MATSUSHITA)
CL : 16V 47μF (Tantalum capacitor, NICHICON, MCE)
CIN : 16V 220μF (Aluminium Electrolytic Capacitor)

Fig.5 XC6383E Application



L : 47μH (SUMIDA, CR-54)
SD : MA2Q735 (Schottky diode; MATSUSHITA)
CL : 16V 47μF (Tantalum capacitor, NICHICON, MCE)
CIN : 16V 220μF (Aluminium Electrolytic Capacitor)
RB : 1kΩ, CB: 3300pF
Tr : 2SC3279, 2SD1628G

Fig.6 XC6383F Application

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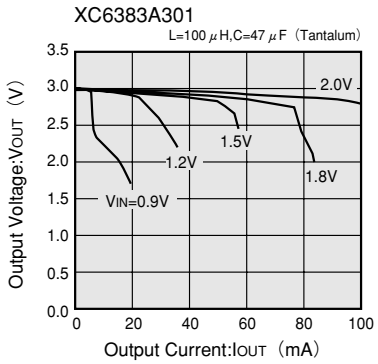
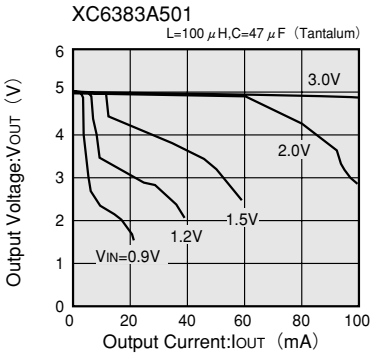
■Typical Performance Characteristics

●XC6383A(Built-in Switching Transistor)
(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT





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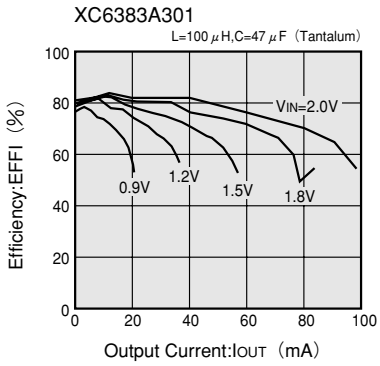
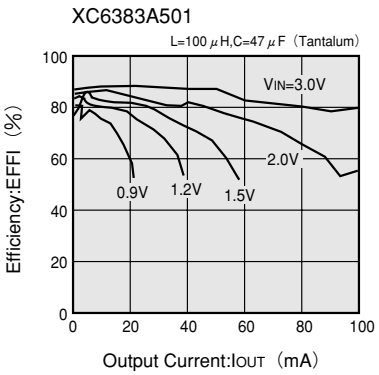
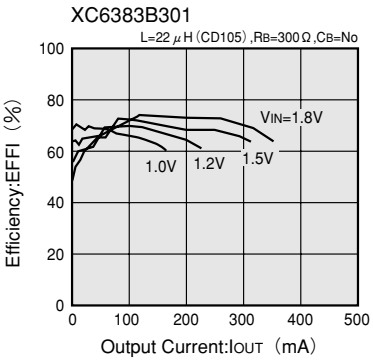
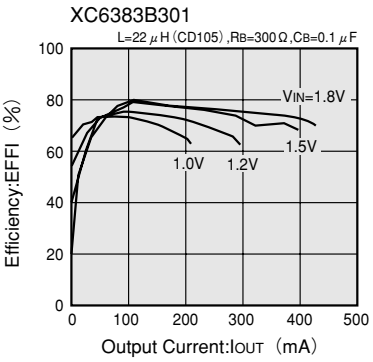
(2) EFFICIENCY vs. OUTPUT CURRENT

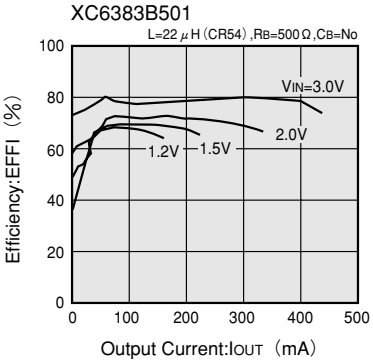


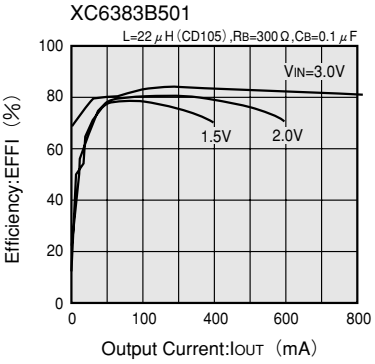


●XC6383B(External Switching Transistor)
(3) EFFICIENCY vs. OUTPUT CURRENT



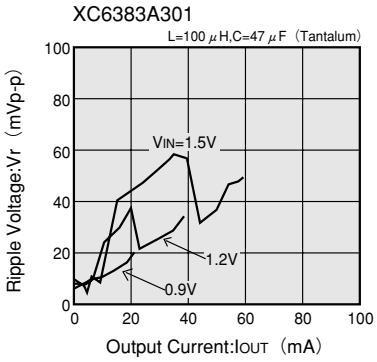


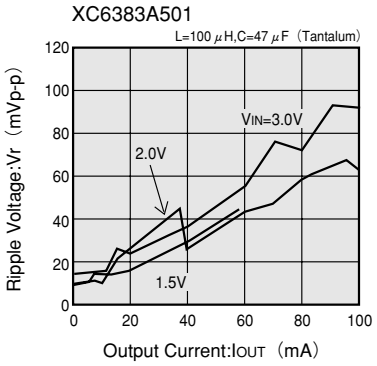




●XC6383A(Built-in Switching Transistor)

(4) RIPPLE VOLTAGE vs. OUTPUT CURRENT

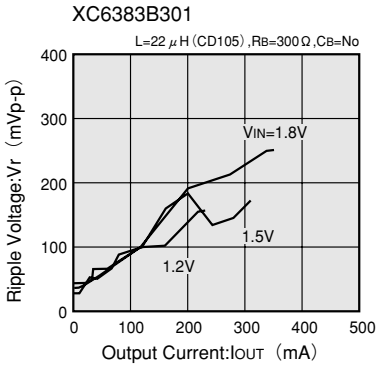


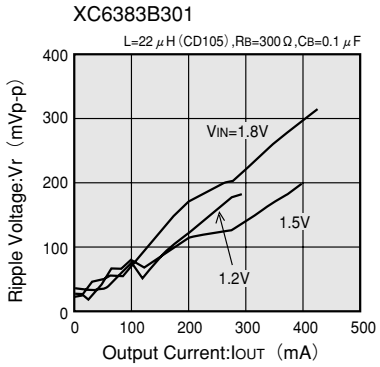


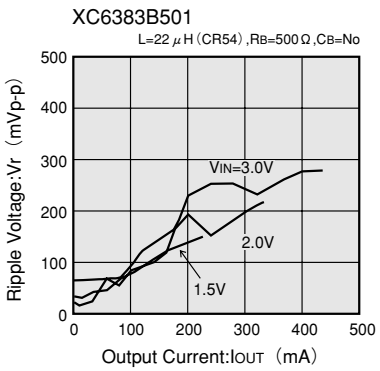
4

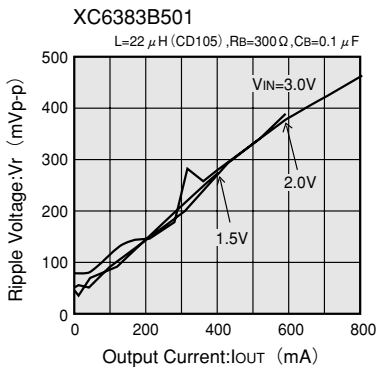
●XC6383B(External Switching Transistor)

(5) RIPPLE VOLTAGE vs. OUTPUT CURRENT



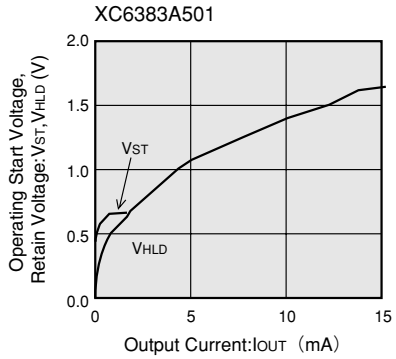




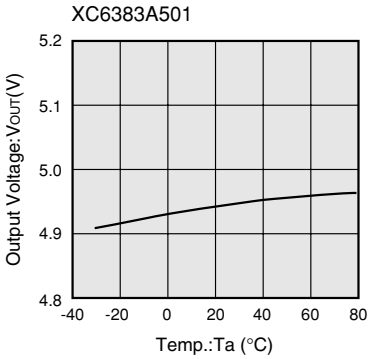


●XC6383A501

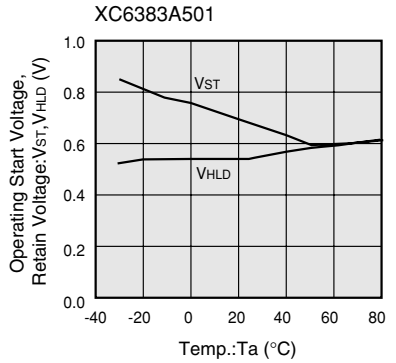
(6) OPERATING START VOLTAGE, RETAIN VOLTAGE vs. OUTPUT CURRENT



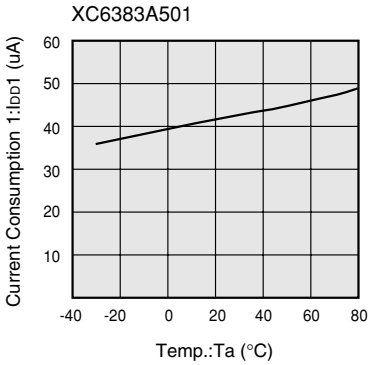
(7) OUTPUT VOLTAGE vs. TEMPERATURE



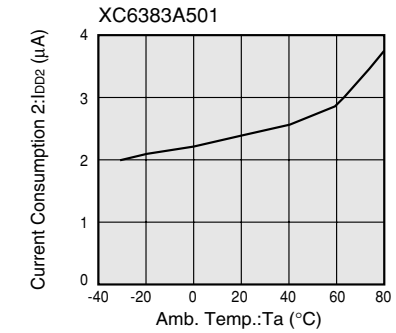
(8) OPERATING START VOLTAGE, RETAIN VOLTAGE vs. TEMPERATURE



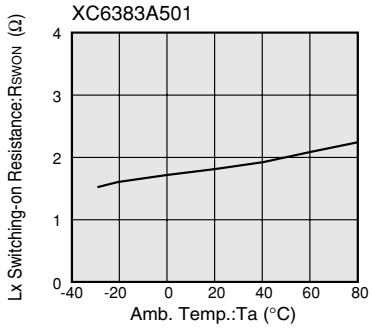
(9) CURRENT CONSUMPTION 1 vs. TEMPERATURE



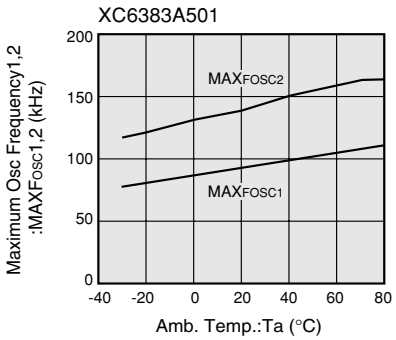
(10) CURRENT CONSUMPTION 2 vs. TEMPERATURE



(11) Lx SWITCHING-ON RESISTANCE vs. TEMPERATURE



(12) MAX. OSC FREQUENCY1,2 vs. AMB. TEMPERATURE



(13) DUTY RATIO 1,2 vs. AMB. TEMPERATURE