



# LR478

## LINEAR INTEGRATED CIRCUIT

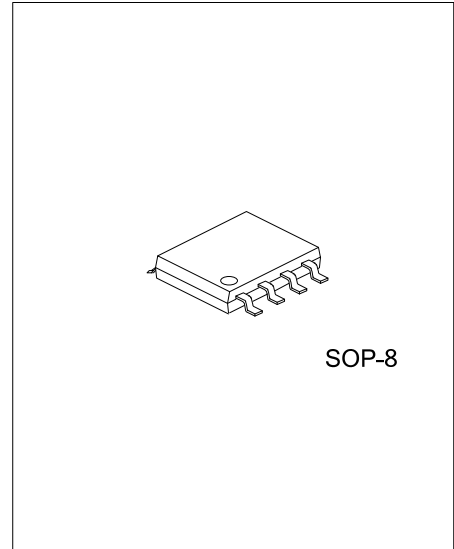
### REGULATOR+RESET IC

#### DESCRIPTION

The UTC **LR478** developed for use in CD-ROM drives, combines a 3V regulator adapted to low power consumption with a much-sought reset function (regulator input monitoring), with internal delay circuit, set to detect 4.2V.

#### FEATURES

- \*Large Output Current: 300mA (max.)
- \*High Ripple Rejection Rate: 80dB(typ.)
- \*Internal Thermal Shutdown Circuit
- \*Internal Current Limiting Circuit
- \*Easy Set Delay Time from Voltage Detection to Reset Release



#### ORDERING INFORMATION

Order Number		Package	Packing
Lead Free	Halogen Free		
LR478L-xx-S08-T	LR478G-xx-S08-T	SOP-8	Tube
LR478L-xx-S08-R	LR478G-xx-S08-R	SOP-8	Tape Reel

Note: XX: Output Voltage, refer to Marking Information.

<p>LR478L-xx-S08-T</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Output Voltage Code</li> <li>(4) Lead Free</li> </ul>	<ul style="list-style-type: none"> <li>(1) T: Tube, R: Tape Reel</li> <li>(2) S08: SOP-8</li> <li>(3) xx: refer to Output Voltage Code</li> <li>(4) L: Lead Free, G: Halogen Free</li> </ul>
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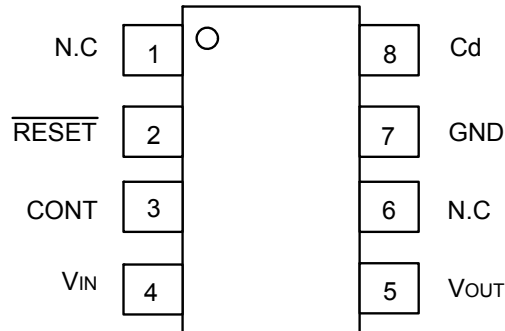
#### OUTPUT DETECTION VOLTAGE RANK LIST

PART NUMBER	REGULATOR OUTPUT VOLTAGE (V)	DETECTION VOLTAGE (V)
LR478-3.4V	3.40±0.05	4.20±0.09
LR478-3.3V	3.30±0.05	4.20±0.09
LR478-2.5V	2.50±0.05	4.20±0.09

#### MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOP-8	25: 2.5V 33: 3.3V 34: 3.4V	<p>Voltage Code ←</p> <p>→ Date Code → L: Lead Free → G: Halogen Free → Lot Code</p>

### ■ PIN CONFIGURATION



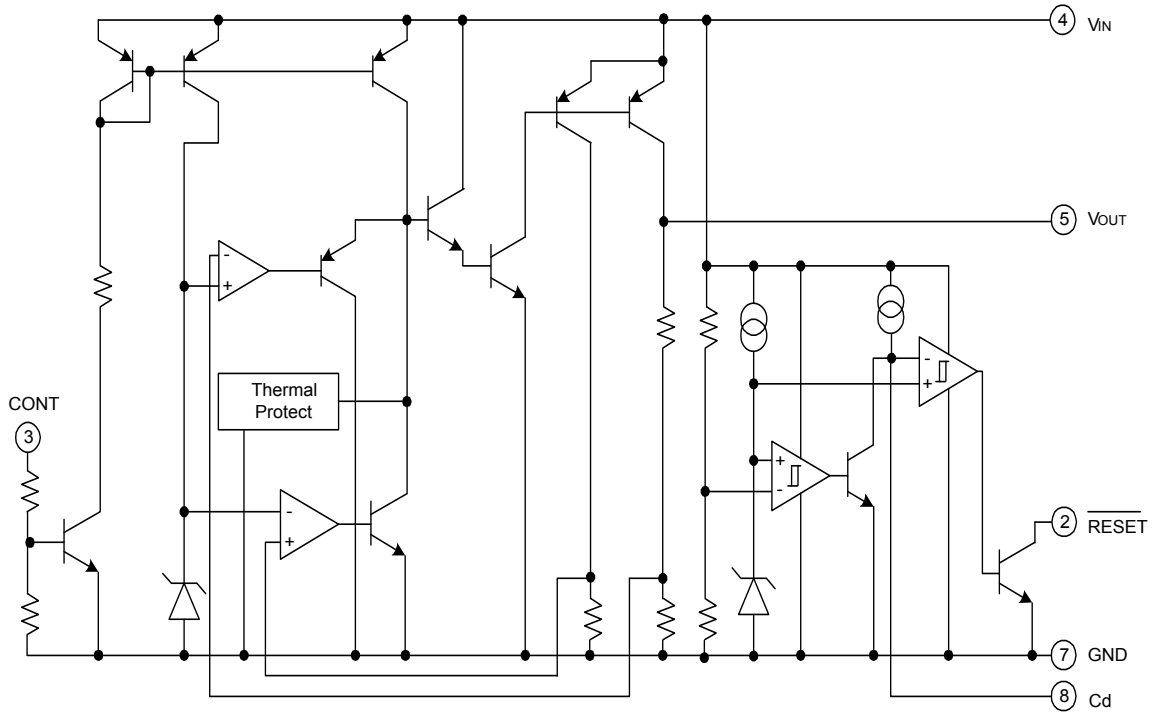
### ■ PIN DESCRIPTION

PIN NO.	PIN NAME	FUNCTIONS	EQUIVALENT CIRCUIT DIAGRAM						
1	N.C								
2	$\overline{\text{RESET}}$	Input voltage detection output Input voltage detection output pin RESET pin logic <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td><math>\overline{\text{RESET}}</math></td> </tr> <tr> <td><math>V_{IN} &lt; V_S</math></td> <td>L</td> </tr> <tr> <td><math>V_{IN} &gt; V_S</math></td> <td>H</td> </tr> </table>		$\overline{\text{RESET}}$	$V_{IN} < V_S$	L	$V_{IN} > V_S$	H	
	$\overline{\text{RESET}}$								
$V_{IN} < V_S$	L								
$V_{IN} > V_S$	H								
3	CONT	Output voltage on/off-control pin <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td><math>V_{CONT}</math></td> <td>Output</td> </tr> <tr> <td>L</td> <td>OFF</td> </tr> <tr> <td>H</td> <td>ON</td> </tr> </table> Connect cont-terminal with $V_{IN}$ when it is not used.	$V_{CONT}$	Output	L	OFF	H	ON	
$V_{CONT}$	Output								
L	OFF								
H	ON								
4	$V_{IN}$	Voltage supply input pin							
5	$V_{OUT}$	Regulator Output pin							
6	N.C								
7	GND	GND pin							
8	Cd	Delay time capacitor pin RESET pin output delay time can be set by the capacitance connected to the Cd pin. $t_{PLH} = 100000.C$ $t_{PLH}$ : transmission delay time[s] C: capacitor value [F]							

# LR478

## LINEAR INTEGRATED CIRCUIT

### ■ BLACK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{IN}$	-0.3 ~ +10	V
Output Current	$I_{OUT}$	400	mA
Power Dissipation(note3)	$P_D$	700	mW
Junction Temperature	$T_J$	+125	°C
Operating Temperature	$T_{OPR}$	-40 ~ +85	°C
Storage Temperature	$T_{STG}$	-40~+150	°C

Note 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. The device is guaranteed to meet performance specification within 0°C ~ +70°C operating temperature range and assured by design from -20°C ~ +85°C.

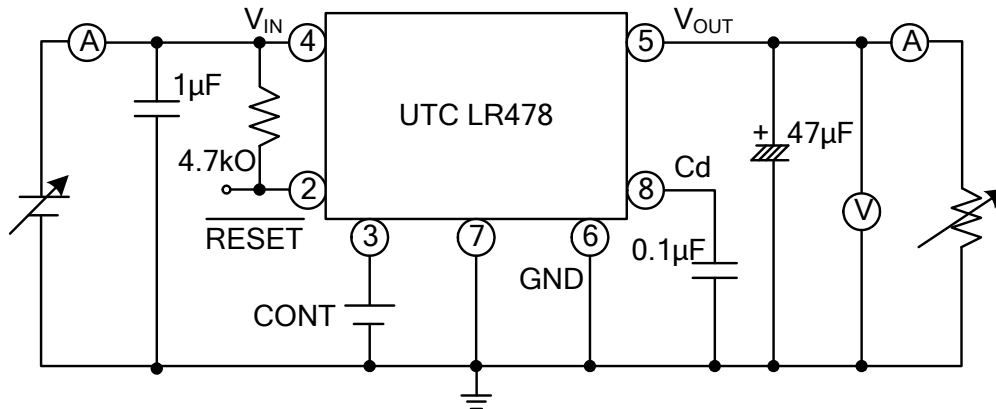
### ■ RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Operating Voltage	$V_{OPR}$	0 ~ 10	V
Output Current	$I_{OUT}$	0 ~ 300	mA

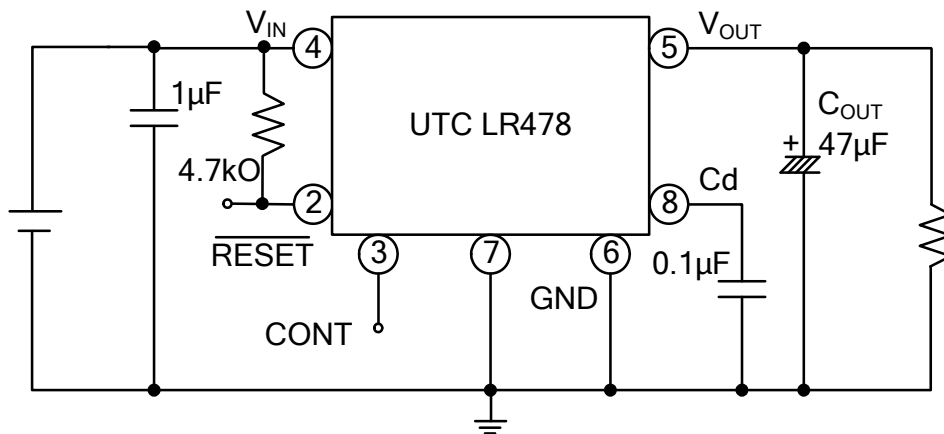
### ■ ELECTRICAL CHARACTERISTICS( $V_{CONT}=1.6V$ , $T_a=25^\circ C$ , unless otherwise specified )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
No-load Input Current 1	$I_{Q1}$	$V_{IN}=5V, I_{OUT}=0mA$		3	8	mA
No-load Input Current 2	$I_{Q2}$	$V_{IN}=4V, I_{OUT}=0mA$		4		mA
Input Current (OFF)	$I_{Q3}$	$V_{IN}=5V, V_{CONT}=0.4V$		250		$\mu A$
<b>Regulator</b>						
Output Voltage	$V_{OUT}$	$V_{IN}=5V, I_{OUT}=30mA$	3.33	3.40	3.47	V
Input-Output Different Voltage	$V_{I/O(DIFF)}$	$V_{IN}=3.2V, I_{OUT}=150mA$		0.15	0.3	V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=4.4\sim 5.5V, I_{OUT}=30mA$		10	20	mV
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=5V, I_{OUT}=0\sim 300mA$		20	120	mV
$V_{OUT}$ Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$V_{IN}=5V, I_{OUT}=30mA, T_J = -20\sim 85^\circ C$		100		ppm/°C
Ripple Rejection	RR	$V_{IN}=5V, I_{OUT}=30mA, f=120Hz$ $V_{RIPPLE}=1V_{P-P}$	50	80		dB
Output Noise Voltage	$V_{IN}$	$V_{IN}=5V, I_{OUT}=30mA, f=20\sim 80kHz$		40	120	$\mu V_{rms}$
CONT Terminal Current	$I_{CONT}$	$V_{CONT}=1.6V$		5	10	$\mu A$
High Threshold Voltage	$V_{THR(H)}$		1.6		$V_{IN}+0.3$	V
Low Threshold Voltage	$V_{THR(L)}$		-0.3		0.4	V
<b>Reset</b>						
Detection Voltage	VS	$V_{IN} = V_{THR(H)} \rightarrow V_{THR(L)}$	4.11	4.20	4.29	V
Vs Temperature Coefficient	$\Delta V_S/\Delta T$	$T_J = -20\sim 85^\circ C$		100		ppm/°C
Hysteresis Voltage	$V_{HYS}$	$V_{IN} = V_{THR(H)} \rightarrow V_{THR(L)} \rightarrow V_{THR(H)}$	100		200	mV
Low-Level Output Voltage	$V_{OL}$	$V_{IN}=3.9V, R_L=4.7K$		100	200	mV
Output Leakage Current	$I_{LEAK}$	$V_{IN}=5V$			$\pm 0.1$	$\mu A$
Output Current 1	$I_{OUT1}$	$V_{IN}=3.9V, R_L=0$	5			mA
Output Current 2	$I_{OUT2}$	$V_{IN}=3.9V, R_L=0, T_a = -20\sim 85^\circ C$	3			mA
"H" Transmission Delay Time	$t_{PLH}$	$C_d = 0.0\mu F$		30	90	$\mu s$
Reset Delay Time	$t_{PLH}$	$V_{IN}=4V \rightarrow 5V, C_d = 0.1\mu F$	5	10	20	ms
"L" Transmission Delay Time	$t_{PLH}$			30	90	$\mu s$
Threshold Operating Voltage	$V_{THR(OPR)}$	$V_{OL}=0.4V$		0.65	0.85	V

## ■ TEST CIRCUIT

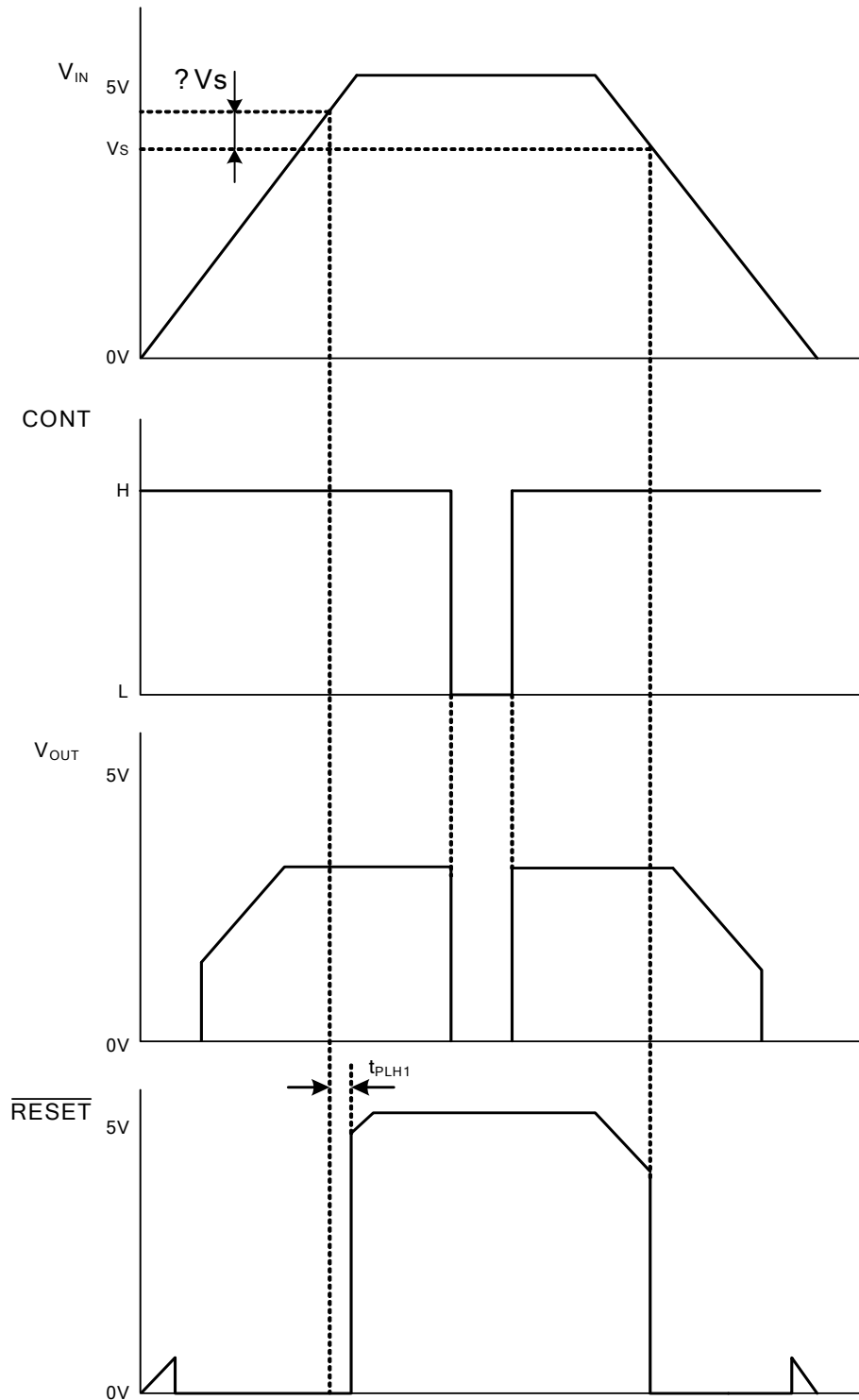


## ■ TYPICAL APPLICATION CIRCUIT

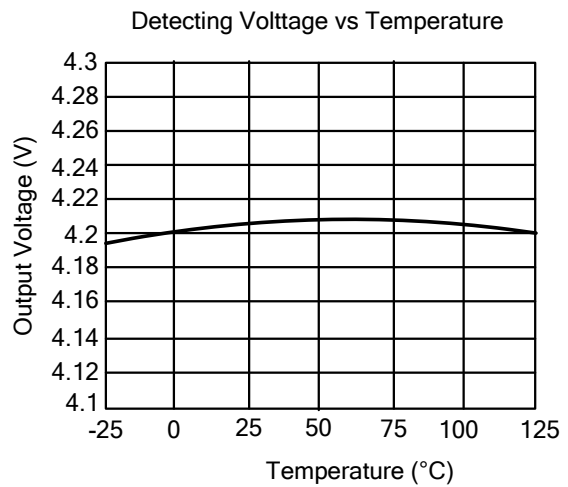
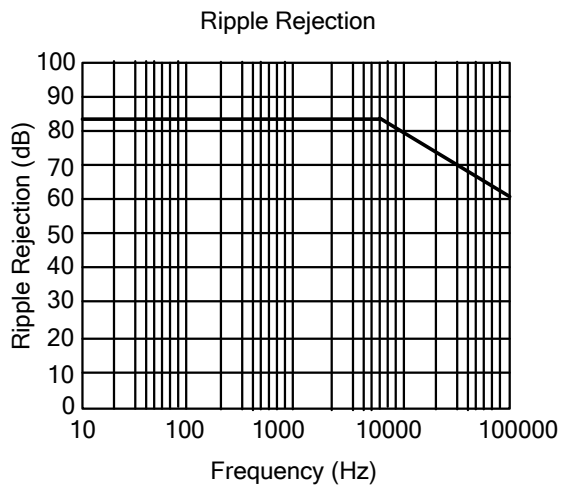
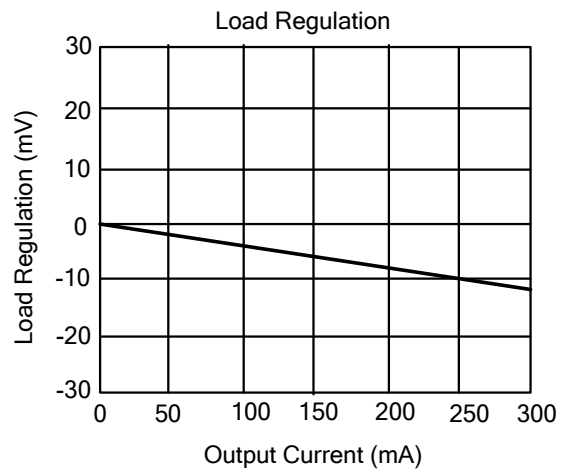
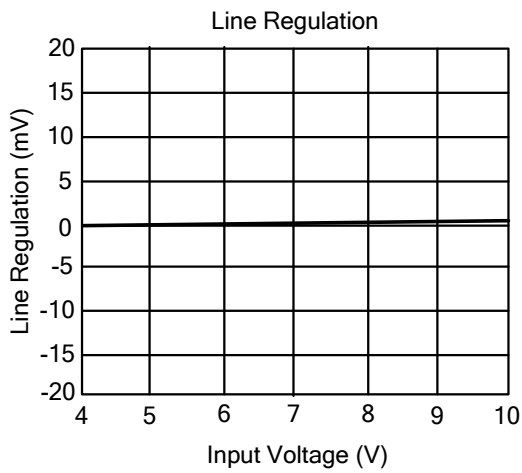
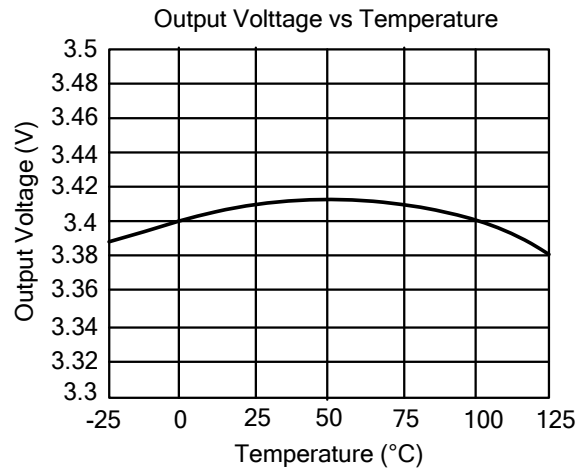
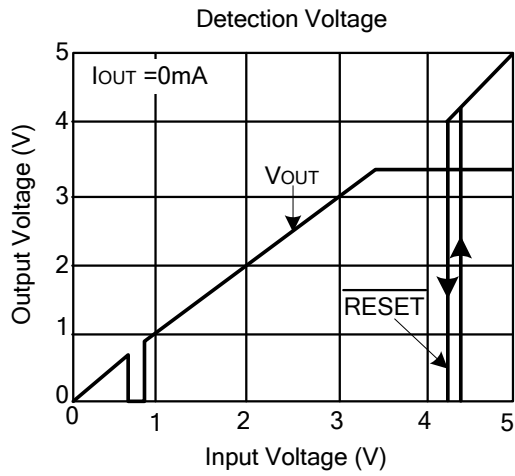


Note: External output-capacitor( $C_{OUT}$ ) for stability is necessary due to without internally compensated.

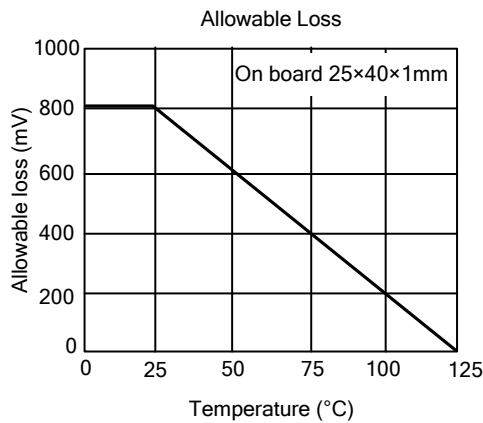
## ■ TIMING CHART



## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS(Cont.)



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