

478MR00 Series

5 to 12V 0.5A 5-Pin Voltage Regulators with Reset Function

The L78MR00 series, 500mA general-purpose voltage regulator ICs provide reset output signal for micro computers.

Features

- · Reset function (power supply voltage monitor : Generates a reset signal at a power-on and temporal power-down).
- Output voltage L78MR05:5V (Reset output On-chip pull-up resistor)

L78MR06:6V (Reset output Open collector) L78MR08:8V (Reset output Open collector) L78MR09:9V (Reset output Open collector)

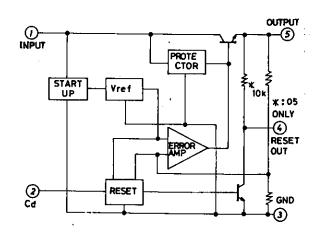
L78MR12: 12V (Reset output Open collector)

- · Output current 500mA
- · On-chip ASO protector.
- · On-chip thermal protector.
- · On-chip over current limiter.
- · The use of package TO220-5H facilitates easy mounting and thermal design.
- · Delay time (t_d) may be set by an external capacitor.

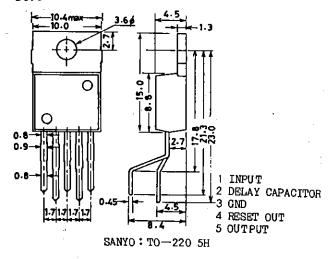
[Common to L78MR00 Series]

Maximum Ratings at Ta = 25°C				unit
Maximum Input Voltage	V_{IN} max		35	V
Reset Pin Supply Voltage	Vreset		35	V
Allowable Power Dissipation	Pd max	No fin	1.75	W
		$T_C = 25^{\circ}C$	20	W
Operating Temperature	Topr		-30 to +80	$^{\circ}\mathrm{C}$
Storage Temperature	Tstg		-55 to +150	$^{\circ}$ C

Equivalent Circuit Block Diagram



Package Dimensions (unit: mm) 3079



Unit (resistance: Ω)

[L78MR05] Recommended Operating	g Cond	itions	at Ta = 25°C			unit	
Input Voltage Output Current	V _{IN} Io				to 20 o 500	V mA	
-				0.0	0 000	шт	
Operating Characteristic		=25°C	$V_{IN} = 10V, I_0 = 0.35A, C_0 = 10 \mu F$	min	typ	max	unit
Output Voltage	Vo1		Tj = 25°C	4.8	5.0	5.2	V
	Vo2		$7V \le V_{IN} \le 20V, 5mA \le I_0 \le 0.35A$	4.75		5.25	V
Line Regulation	ΔVo		$Tj = 25$ °C, $7V \le V_{IN} \le 25V$, $Io = 0.2A$		1.0	100	mV
			$T_j = 25$ °C, $8V \le V_{IN} \le 25V$, $I_0 = 0.2A$		0.5	50	mV
Load Regulation	ΔV_0		$Tj = 25$ °C, $5mA \le Io \le 0.5A$		3.0	100	mV
~	_	LD2	$Tj = 25$ °C, $5mA \le Io \le 0.2A$		1.5	50	mV
Current Dissipation	I_{CC}		Tj = 25°C		3.4	6.0	mA
Current Dissipation Variation (Line)	ΔI_{CC}	LN	$8V \le V_{IN} \le 25V$, $Io \le 0.2A$			0.8	mA
Current Dissipation Variation (Load)	ΔI _{CC}	LD	$5mA \le I_0 \le 0.35A$			0.5	mA
Output Noise Voltage	V_{NO}		$Io = 5mA, 10Hz \le f \le 100kHz$		60		μV
Ripple Rejection	Rr1		$T_j = 25$ °C, $f = 120$ Hz,	62	80		dB
			$8V \le V_{IN} \le 18V$, $I_0 = 0.1A$				-
	Rr2		$T_j = 25^{\circ}C, f = 120Hz,$	62	77		dB
			$8V \le V_{IN} \le 18V, I_0 = 0.3A$				
Dropout Voltage	Vdrop		,		2.0	2.5	V
Peak Output Current	I_{OP}		Tj = 25°C		1.1		Α
Short Circuit Current	I_{OSC}		$Tj = 25$ °C, $V_{IN} = 35V$		0.02		Α
Temperature Coefficient of Output Voltage	Δ¥o/Δ	T	Io = 5mA , Tj = $25 \text{ to } 125 ^{\circ}\text{C}$		0.3	n	aV/°C
'L' Reset Output Voltage	V_{ORL}		$V_0 \le 4.5V$, $I_0 = 5mA$			0.2	v
Reset Threshold Voltage	V_{RT}		Io = 5mA	Vo-0.3V	0 - 0.2		v
Reset Hysteresis Voltage	V_{RTH}		Io = 5mA	,	100		mV
Reset Output Delay Time	t_d		$Cd = 0.1 \mu F$, $Io = 5 mA$		10		ms
EL GOLGO							
[L78MR06]							
Recommended Operating		itions	at Ta = 25°C			unit	
Input Voltage	v_{in}				to 21	V	
Output Current	Io			5 te	o 500	mA	
Reset Output Current	Io_R		$V_0 \leq 5.64V$		20	mA ı	nax
Operating Characteristics	sat Tas	25°C	$V_{IN} = 11V$, $V_{IO} = 0.35A$, $C_0 = 10 \mu F$:			!4
Output Voltage	Vo1	- 20 0	$T_j = 25^{\circ}C$	min 5.75	typ	max	unit
o aspar voltage	Vo2		$8V \le V_{IN} \le 21V$, $5mA \le Io \le 0.35A$	5.75 5.7	6.0	6.25	V
Line Regulation	ΔVo	LNI	$T_j = 25^{\circ}C$, $8V \le V_{IN} \le 25V$, $I_0 = 0.2A$	0.7	1.2	6.3	V V
	210	LN2	$T_j = 25^{\circ}C$, $6V = V_{IN} = 25V$, $10 = 0.2A$		0.6	100	mV
Load Regulation	ΔVo		$T_j = 25^{\circ}C$, $5M \le V_{1N} = 25V$, $10 = 0.2A$ $T_j = 25^{\circ}C$, $5MA \le I_0 \le 0.5A$		4.0	50	mV
20aa 10gaaann	410		$T_j = 25^{\circ}C$, $5mA \le I_0 \le 0.2A$		2.0	120 60	mV
Current Dissipation	I_{CC}		$T_j = 25$ °C	•	3.4	6.0	mV mA
Current Dissipation	ΔI_{CC}	LN	$9V \le V_{IN} \le 25V$, $I_0 \le 0.2A$		J.4	0.8	mA
Variation (Line)	00		$V = V_{\text{IN}} = 20 \text{ V}, 10 = 0.211$			0.6	шм
Current Dissipation	ΔI_{CC}	LD	5mA≦Io≦0.35A			0.5	m A
Variation (Load)	00					0.0	mA
Output Noise Voltage	V_{NO}		$I_0 = 5 \text{mA}, 10 \text{Hz} \leq f \leq 100 \text{kHz}$		70		μV
Ripple Rejection	Rr1		Tj = 25°C, $f = 120$ Hz,	59	80		μν dB
***			$9V \le V_{IN} \le 19V$, $I_0 = 0.1A$	00	50		uD
	Rr2		$T_j = 25$ °C, $f = 120$ Hz,	59	75		dB
			$9V \le V_{IN} \le 19V$, $I_0 = 0.3A$	70			an,
				Continued on next page			

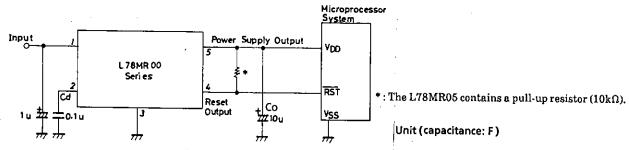
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Dropout Voltage	Vdmon	_		min	typ	max	unit	
Peak Output Current	Vdrop		T: _ 05°C		2.0	2.5	V	
Short Circuit Current	IOP		Tj=25°C		1.1		A	
Temperature Coefficient	Iosc		$T_{\rm j} = 25^{\circ}\text{C}, V_{\rm iN} = 35V$		0.02		A	
of Output Voltage	Δ ۷ 0/2	71	Io = 5 mA, Tj = 25 to 125 °C		-0.4	n	nV/°C	
'L' Reset Output Voltage	V_{ORL}		$V_0 \le 5.64 \text{V}, I_{OR} = 20 \text{mA}, I_0 = 5 \text{mA}$	A				
Reset Output Leakage	I _{RL}		$V_{R} = 35V$	Η.		0.8	V	
Current	-KL		V R - 55 V			50	μ A	
Reset Threshold Voltage	$V_{\mathbf{p}_{T}}$		Io=5mA	Vo 0263	To 0.94		V	
Reset Hysteresis Voltage			Io=5mA	Vo-0.36 Vo-0.24 120			mV	
Reset Output Delay Time			$Cd = 0.1 \mu F$, $Io = 5mA$	10			ms	
-	u		3.2,20 3.2.2		10		1115	
[L78MR08]								
Recommended Operating	g Cond	itions	s at $Ta = 25$ °C			unit		
Input Voltage	V_{IN}			10.5 to 23		V		
Output Current	Io			5	5 to 500			
Reset Output Current	Io_R		Vo≦7.2V		20	mA m	ax	
Onoughture Charles 4		0 504						
Output Value	sat'la	= 25°($V_{IN} = 14V$, $I_0 = 0.35A$, $C_0 = 10 \mu F$		typ	max	unit	
Output Voltage	Vol		Tj = 25°C	7.7	8.0	8.3	V	
	Vo2		$10.5V \le V_{\rm IN} \le 23V,$	7.6		8.4	V	
Line Regulation	A 1 7.	T 3.T 1	5mA≤Io≤0.35A					
Diffe Regulation	ΔVo	TINI	$T_{\rm J} = 25^{\circ} \text{C}, 10.5 \text{V} \le \text{V}_{\rm IN} \le 25 \text{V},$		1.6	100	mV	
		I NIO	Io=0.2A					
		DINZ	$T_j = 25$ °C, $11V \le V_{IN} \le 25V$, $I_0 = 0.2A$		0.8	50	mV	
Load Regulation	ΔV_0 .	I.D1	$Tj=25^{\circ}C$, $5mA \leq I_0 \leq 0.5A$		۲n	100	77	
			$T_j = 25$ °C, $5mA \le 10 \le 0.5A$ $T_j = 25$ °C, $5mA \le 10 \le 0.2A$	•	$\frac{5.0}{2.0}$	160	mV	
Current Dissipation	I_{CC}	~~~	Tj=25°C		3.5	80 6.0	mV	
Current Dissipation	ΔI_{CC}	LN	$10.5V \le V_{IN} \le 25V$, $I_0 \le 0.2A$		0.0	0.8	mA mA	
(Variation (Line)	00		10 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			0.6	III	
Current Dissipation	ΔI_{CC}	LD	$5\text{mA} \leq I_0 \leq 0.35\text{A}$			0.5	mA	
(Variation (Load)	-					0.0	11177	
Output Noise Voltage	V_{NO}		$Io = 5mA$, $10Hz \le f \le 100kHz$		100		μV	
Ripple Rejection	Rr1		$T_j = 25^{\circ}C, f = 120Hz,$	56	75		ďΒ	
* v			$11.5V \le V_{IN} \le 21.5V$, $I_0 = 0.1A$				4.5	
	Rr2		$Tj = 25^{\circ}C, f = 120Hz,$	56	71		dB	
D			$11.5V \le V_{IN} \le 21.5V$, $I_0 = 0.3A$					
Dropout Voltage	Vdrop				2.0	2.5	v	
Peak Output Current	IOP		Tj = 25°C		1.1		Α	
Short Circuit Current	I_{OSC}	m	$T_{j} = 25^{\circ}C, V_{IN} = 35V$		0.02		Α	
Temperature Coefficient	$\Delta V_0/\Delta$	T	$Io = 5 \text{ mA}$, $Tj = 25 \text{ to } 125 ^{\circ}\text{C}$		-0.7	m	V/°C	
of Output Voltage L'Reset Output Voltage	X 7		V 7 O. I. I. O. A. Y. W. A.					
Reset Output Leakage			$V_0 \le 7.2V$, $I_{0R} = 20$ mA, $I_0 = 5$ mA			0.8	V	
Current	I_{RL}		$V_R = 35V$			50	μ A	
Reset Threshold Voltage	Vpm		Io=5mA	11 A			•-	
Reset Hysteresis Voltage	VDDIT		Io=5mA	Vo - 0.48 Vo			V	
Reset Output Delay Time	ta ta		$Cd = 0.1 \mu F$, $Io = 5 mA$		160		mV	
,	-u		ου σ.τμι, 10 – σμητ		10		ms	

[L78MR09]							
Recommended Operating		ition	s at $Ta = 25$ °C			unit	
Input Voltage	v_{in}				l 2 to 24	V	
Output Current	Io		•		5 to 500	mA	
Reset Output Current	Io_R $V_0 \leq 8.1$		Vo≤8.1V		20	mA n	nax
Operating Characteristic	s at Ta	=25°	C, $V_{IN} = 15V$, $I_0 = 0.35A$, $C_0 = 10\mu F$	` min	typ	max	unit
Output Voltage	Vo1		Tj=25°C	8.6	9.0	9.4	V
-	Vo2		$11.5V \le V_{IN} \le 24V,$	8.5	0.0	9.5	Ÿ
			5mA≤Io≤0.35A			0.0	•
Line Regulation	ΔVo	LN1	$Tj = 25$ °C, $11.5V \le V_{IN} \le 25V$,		1.6	100	mV
			$I_0 = 0.2A$		2.0	200	111 7
		LN2	$2 \text{ Tj} = 25^{\circ}\text{C}, 12\text{V} \le \text{V}_{\text{IN}} \le 25\text{V},$		0.8	50	mV
			$I_0 = 0.2A$				'
Load Regulation	ΔV_0	LD1	$T_j = 25$ °C, $5mA \le I_0 \le 0.5A$		5.0	180	mV
		LD2	$Tj = 25$ °C, $5mA \le I_0 \le 0.2A$		3.0	90	mV
Current Dissipation	I_{CC}		Tj = 25°C		3.5	6.0	mA
Current Dissipation	ΔI_{CC}	LN	$11.5V \le V_{IN} \le 25V, I_0 \le 0.2A$			0.8	mA
Variation (Line)							
Current Dissipation Variation (Load)	ΔI _{CC}	LD	$\cdot 5 \text{mA} \leq I_0 \leq 0.35 \text{A}$			0.5	mA
Output Noise Voltage	V_{NO}		$I_0 = 5 \text{mA}, 10 \text{Hz} \leq f \leq 100 \text{kHz}$		110		μV
Ripple Rejection	Rr1		$T_j = 25$ °C, $f = 120$ Hz,	56	73		dΒ
			$12V \le V_{IN} \le 22V$, $I_0 = 0.1A$				uD
	Rr2		$T_j = 25^{\circ}C, f = 120Hz,$	56	70		dB
			$12V \le V_{IN} \le 22V$, $I_0 = 0.3A$				u.
Dropout Voltage	Vdrop		- - ,		2.0	2.5	v
Peak Output Current	I_{OP}		Tj = 25°C		1.1		À
Short Circuit Current	I_{OSC}		$T_j = 25$ °C, $V_{IN} = 35V$		0.02		Ā
Temperature Coefficient of Output Voltage	∆Vo/∆	Т	$Io = 5mA, Tj = 25 \text{ to } 125^{\circ}C$		-0.9	n	nV/°C
'L' Reset Output Voltage	v_{orl}		$Vo \le 8.1V$, $Io_R = 20mA$, $Io = 5mA$			0.8	V
Reset Output Leakage	I_{RL}		$V_R = 35V$			50	μÀ
(Current							,
Reset Threshold Voltage	$ m V_{RT}$		Io = 5mA	Vo-0.54 V	o-0.36		v
Reset Hysteresis Voltage	V_{RTH}		Io = 5mA		180		mV
Reset Output Delay Time	t_d		$Cd = 0.1 \mu F$, $Io = 5 mA$		10		ms
[L78MR12]					٠		
	: O = ald	42					
Recommended Operating Input Voltage		tions	at Ta=25°C			unit	
Output Current	$rac{ m V_{IN}}{ m Io}$.				5 to 27	V	
			V-<10.0V	5	to 500	mA	
reset Output Current	Io_R		Vo≤10.8V		20	mA m	ax
Operating Characteristics	at Ta=	= 25°C	$V_{IN} = 19V$, $V_{IO} = 0.35A$, $C_0 = 10 \mu F$	min	typ	max	unit
Output Voltage	Vo1		Tj=25°C	11.5	12.0	12.5	V
	Vo2		$14.5V \le V_{IN} \le 27V$,	11.4	12.0	12.6	v
			5mA≦Io≦0.35A			15.0	•
Line Regulation	ΔV_0	LN1	$T_j = 25$ °C, $14.5V \le V_{IN} \le 30V$,		2.4	100	mV
			$I_0 = 0.2A$		1	100	****
		LN2	$T_j = 25$ °C, $16V \le V_{IN} \le 30V$,		1.2	5 0	mV
•			$I_0 = 0.2A$		<u>.</u>	00	777 A
Load Regulation			$Tj = 25$ °C, $5mA \le I_0 \le 0.5A$		7.0	240	mV
_			$T_j = 25$ °C, $5mA \le I_0 \le 0.2A$		4.0	120	mV
Current Dissipation	I_{CC}		Tj = 25°C		3.7	6.0	mΑ
				Cor	ntinued		
				~ 0.	uvu	JAL ALGAD	Lage.

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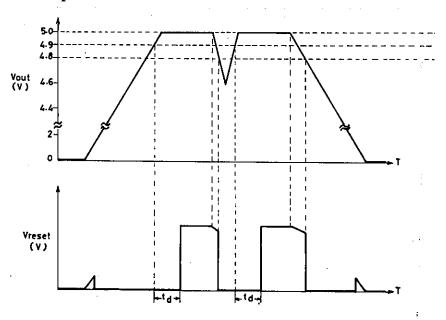
Current Dissipation Variation (Line)	ΔI_{CC}	LN	$14.5V \le V_{IN} \le 30V$, $I_0 \le 0.2A$	min	typ	max 0.8	unit mA
Current Dissipation Variation (Load)	ΔI_{CC}	LD	$5\text{mA} \leq I_0 \leq 0.35\text{A}$			0.5	mA
Output Noise Voltage	v_{NO}		$Io = 5mA$, $10Hz \le f \le 100kHz$		140		μV
Ripple Rejection	Rr1		$Tj = 25^{\circ}C, f = 120Hz,$ $15V \le V_{IN} \le 25V, I_0 = 0.1A$	55	68		dB
	Rr2		$T_j = 25^{\circ}C$, $f = 120Hz$, $15V \le V_{IN} \le 25V$, $I_0 = 0.3A$	55	66	÷	dB
Dropout Voltage	Vdrop		All was year		2.0	2.5	v
Peak Output Current	IOP		$T_j = 25$ °C		1.1		Á
Short Circuit Current	I_{OSC}		$T_j = 25$ °C, $V_{IN} = 35$ V		0.02		Â
Temperature Coefficient of Output Voltage		T	$Io = 5 \text{ mA}, Tj = 25 \text{ to } 125 ^{\circ}\text{C}$		-1.6	m	v/°C
'L' Reset Output Voltage	V_{ORL}		$V_0 \le 10.8 \text{V}, I_{0R} = 20 \text{mA}, I_0 = 5 \text{mA}$			0.8	v
Reset Output Leakage Current	I_{RL}	-	$V_R = 35V$			50	μ A
Reset Threshold Voltage	V_{RT}		Io = 5mA	Vo - 0.72 V	o-0.48		v
Reset Hysteresis Voltage			Io = 5mA		240		mV
Reset Output Delay Time	t_d		$Cd = 0.1 \mu F$, $Io = 5 mA$		10		ms

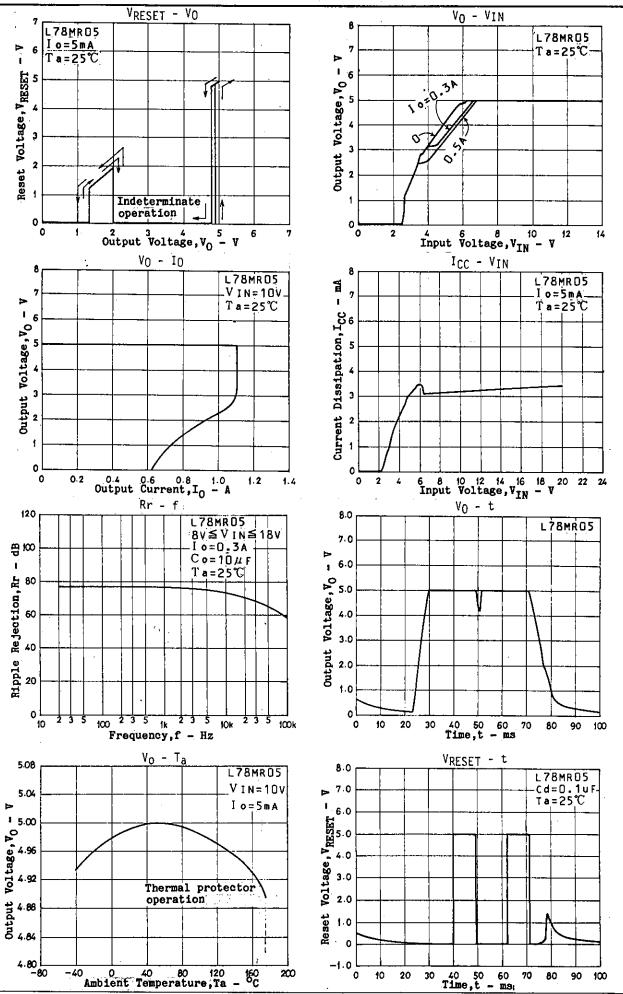
Sample Application Circuit

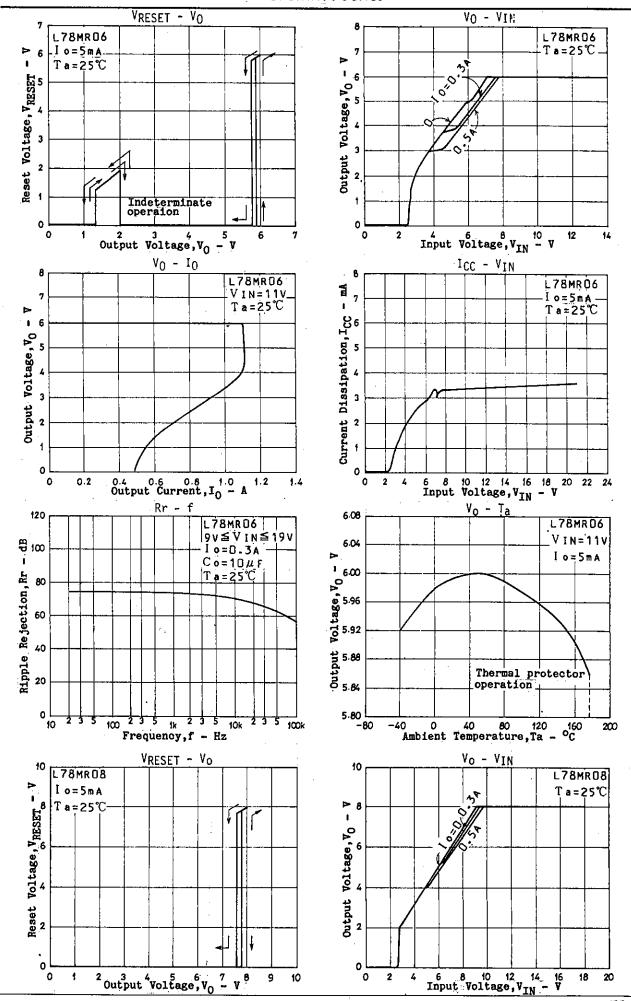


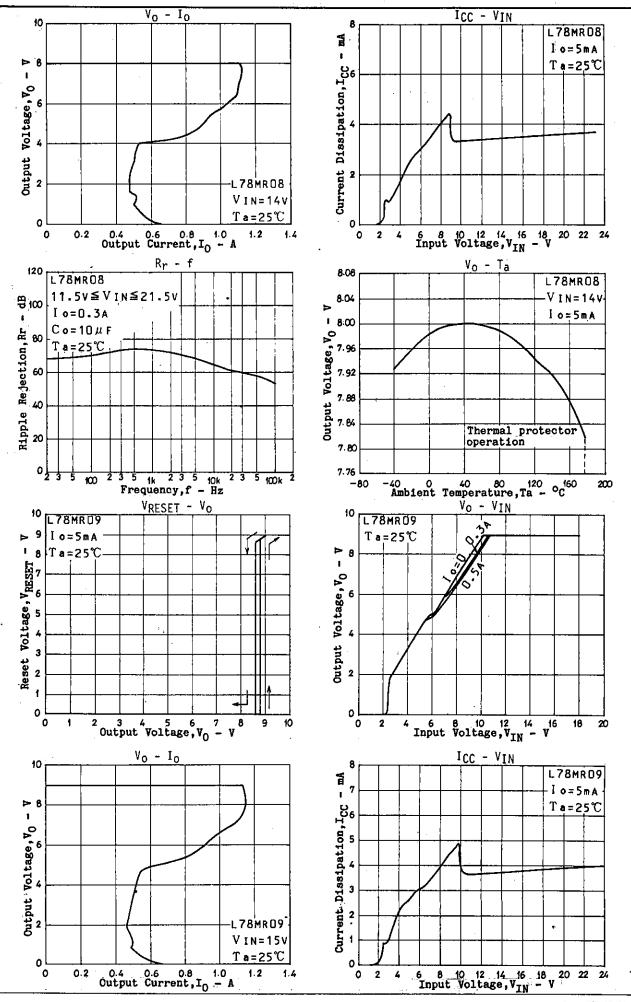
Note on use) If a load current (in particular, pulse-like load current) that is greater than a rated value is used, a reset signal may be generated due to the overload. Please keep it in mind.

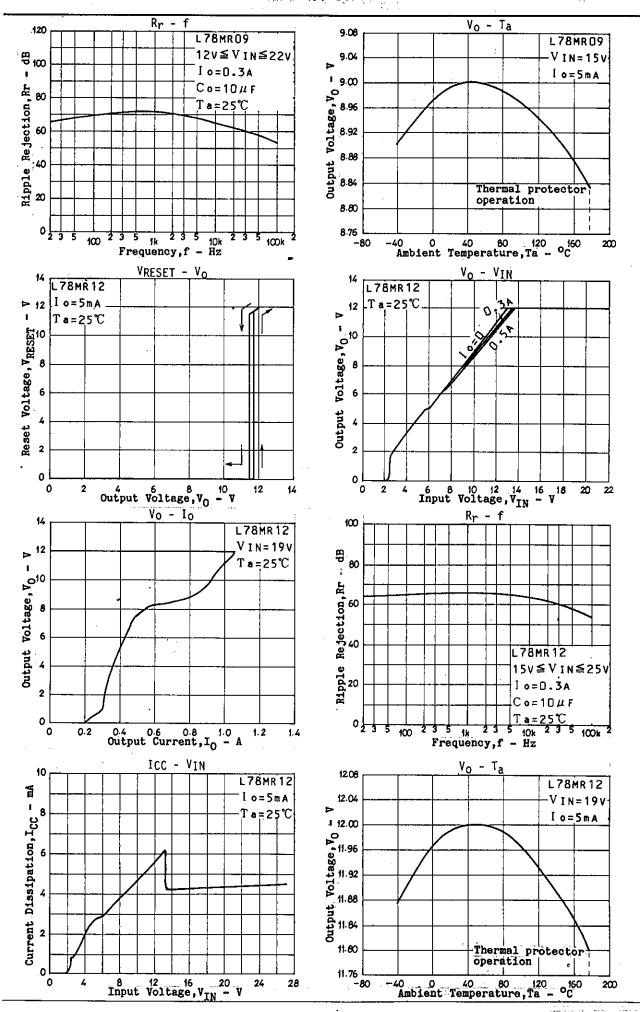
L78MR05 Reset Operation

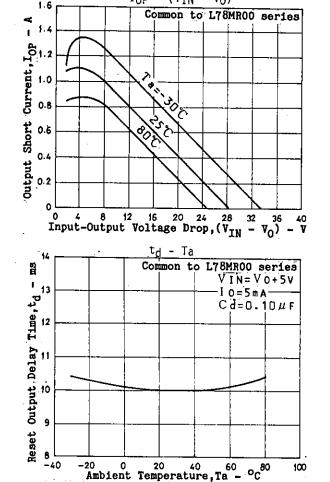




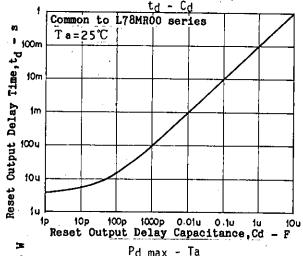


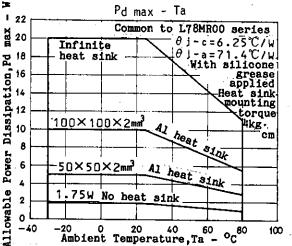






IOP - (VIN - VO)





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