Ordering number:ENN2168B

Monolithic Linear IC

L78MR00 Series

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

Overview

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

Features

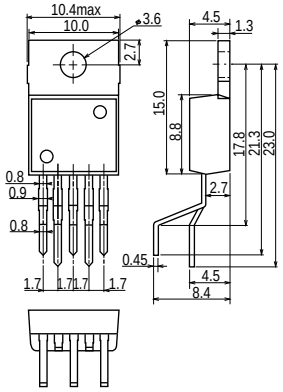
- Reset function (power supply voltage monitor : Generates a reset signal at a power-on and temporal power-down).
- Output voltage
  L78MR05 : 5V (Reset output ..... On-chip pull-up resistor)
  ~~L78MR06 : 6V (Reset output ..... Open collector)~~
  ~~L78MR08 : 8V (Reset output ..... Open collector)~~
  ~~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 overcurrent limiter.
- The use of package TO220-5H facilitates easy mounting and thermal design.
- Delay time (t_d) may be set by an external capacitor.

Package Dimensions

unit:mm

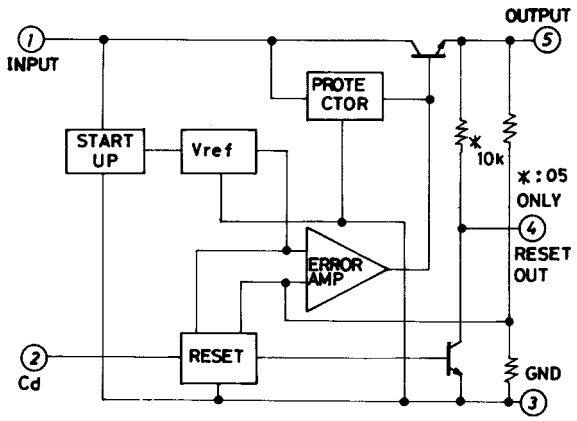
3079

[L78MR00 Series]



1 : INPUT
2 : DELAY CAPACITOR
3 : GND
4 : RESET OUT
5 : OUTPUT
SANYO : TO-220-5H

Equivalent Circuit



Unit (resistance: Ω)

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges,or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

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Specifications

[Common to L78MR00 Series]

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	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
		Tc=25°C	20	W
Operating Temperature	Topr		–30 to +80	˚C
Storage Temperature	Tstg		–55 to +150	˚C

[L78MR05]

Recommended Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Input Voltage	V_{IN}		7.5 to 20	V
Output Current	I_{OUT}		5 to 500	mA

Operating Characteristics at Ta = 25˚C, V_{IN}=10V, I_O=0.35A, C_O=10μF

Parameter	Symbol	Conditions		Ratings min	Ratings typ	Ratings max	Unit
Output Voltage	V_O1		Tj=25°C	4.8	5.0	5.2	V
	V_O2		7V≤V_{IN}≤20V, 5mA≤I_O≤0.35A	4.75		5.25	V
Line Regulation	ΔV_O	LN1	Tj=25°C, 7V≤V_{IN}≤25V, I_O=0.2A		1.0	100	mV
		LN2	Tj=25°C, 8V≤V_{IN}≤25V, I_O=0.2A		0.5	50	mV
Load Regulation	ΔV_O	LD1	Tj=25°C, 5mA≤I_O≤0.5A		3.0	100	mV
		LD2	Tj=25°C, 5mA≤I_O≤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≤V_{IN}≤25V, I_O=0.2A			0.8	mA
Current Dissipation Variation (Load)	ΔI_{CC}	LD	5mA≤I_O≤0.35A			0.5	mA
Output Noise Voltage	V_{NO}		I_O=5mA, 10Hz≤f≤100kHz		60		ÕV
Ripple Rejection	Rr1		Tj=25°C, f=120Hz, 8V≤V_{IN}≤18V, I_O=0.1A	62	80		dB
	Rr2		Tj=25°C, f=120Hz, 8V≤V_{IN}≤18V, I_O=0.3A	62	77		dB
Dropout Voltage	Vdrop				2.0	2.5	V
Peak Output Current	I_{OP}		Tj=25°C		1.1		A
Short Circuit Current	I_{OSC}		Tj=25°C, V_{IN}=35V		0.02		A
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$		I_O=5mA, Tj=25 to 125°C		–0.3		mV/˚C
'L' Reset Output Voltage	V_{ORL}		V_O≤4.5V, I_O=5mA			0.2	V
Reset Threshold Voltage	V_{RT}		I_O=5mA	V_O–0.3	V_O–0.2		V
Reset Hysteresis Voltage	V_{RTH}		I_O=5mA		100		mV
Reset Output Delay Time	t_d		Cd=0.1ÕF, I_O=5mA		10		ms

[L78MR06]

Recommended Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Input Voltage	V_{IN}		8.5 to 21	V
Output Current	I_O		5 to 500	mA
Reset Output Current	I_{OR}	V_O≤5.64V	20 max	mA

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[L78MR09]

Recommended Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Input Voltage	V_{IN}		12 to 24	V
Output Current	I_O		5 to 500	mA
Reset Output Current	I_{OR}	V_O≤8.1V	20 max	mA

Operating Characteristics at Ta = 25˚C, V_{IN}=15V, I_O=0.35A, C_O=10µF

Parameter	Symbol	Conditions		Ratings			Unit
				min	typ	max	
Output Voltage	V_O1		Tj=25°C	8.6	9.0	9.4	V
	V_O2		11.5V≤V_{IN}≤24V, 5mA≤I_O≤0.35A	8.5		9.5	V
Line Regulation	ΔV_O	LN1	Tj=25°C, 11.5V≤V_{IN}≤25V, I_O=0.2A		1.6	100	mV
		LN2	Tj=25°C, 12V≤V_{IN}≤25V, I_O=0.2A		0.8	50	mV
Load Regulation	ΔV_O	LD1	Tj=25°C, 5mA≤I_O≤0.5A		5.0	180	mV
		LD2	Tj=25°C, 5mA≤I_O≤0.2A		3.0	90	mV
Current Dissipation	I_{CC}		Tj=25°C		3.5	6.0	mA
Current Dissipation Variation (Line)	ΔI_{CC}	LN	11.5V≤V_{IN}≤25V, I_O=0.2A			0.8	mA
Current Dissipation Variation (Load)	ΔI_{CC}	LD	5mA≤I_O≤0.35A			0.5	mA
Output Noise Voltage	V_{NO}		I_O=5mA, 10Hz≤f≤100kHz		110		ÕV
Ripple Rejection	Rr1		Tj=25°C, f=120Hz, 12V≤V_{IN}≤22V, I_O=0.1A	56	73		dB
	Rr2		Tj=25°C, f=120Hz, 12V≤V_{IN}≤22V, I_O=0.3A	56	70		dB
Dropout Voltage	Vdrop				2.0	2.5	V
Peak Output Current	I_{OP}		Tj=25°C		1.1		A
Short Circuit Current	I_{OSC}		Tj=25°C, V_{IN}=35V		0.02		A
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$		I_O=5mA, Tj=25 to 125°C		–0.9		mV/˚C
'L' Reset Output Voltage	V_{ORL}		V_O≤8.1V, I_{OR}=20mA, I_O=5mA			0.8	V
Reset Output Leakage Current	I_{RL}		V_R=35V			50	ÕA
Reset Threshold Voltage	V_{RT}		I_O=5mA	V_O–0.54	V_O–0.36		V
Reset Hysteresis Voltage	V_{RTH}		I_O=5mA		180		mV
Reset Output Delay Time	t_d		Cd=0.1ÕF, I_O=5mA		10		ms

[L78MR12]

Recommended Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Input Voltage	V_{IN}		15 to 27	V
Output Current	I_O		5 to 500	mA
Reset Output Current	I_{OR}	V_O≤10.8V	20 max	mA

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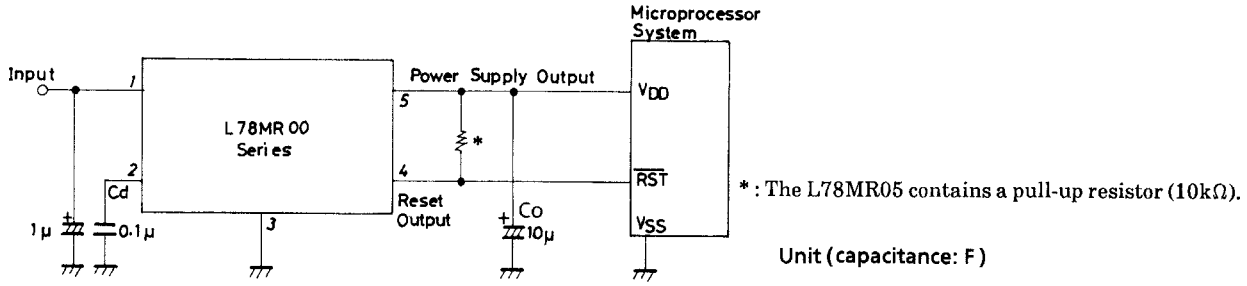
Operating Characteristics at Ta = 25˚C, V_{IN}=19V, I_O=0.35A, C_O=10µF

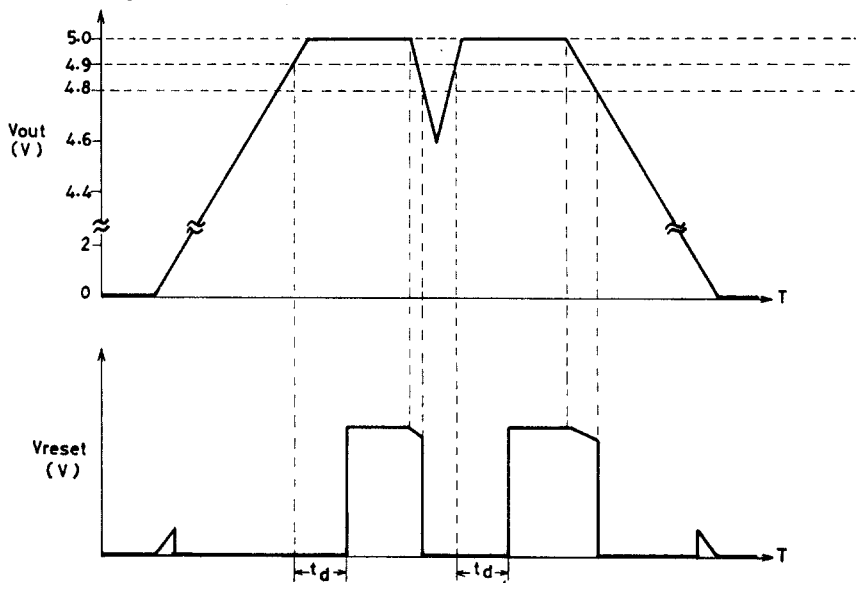
Parameter	Symbol	Conditions		Ratings min	Ratings typ	Ratings max	Unit
Output Voltage	V_O1		Tj=25°C	11.5	12.0	12.5	V
	V_O2		14.5V≤V_{IN}≤27V, 5mA≤I_O≤0.35A	11.4		12.6	V
Line Regulation	ΔV_O	LN1	Tj=25°C, 14.5V≤V_{IN}≤30V, I_O=0.2A		2.4	100	mV
		LN2	Tj=25°C, 16V≤V_{IN}≤30V, I_O=0.2A		1.2	50	mV
Load Regulation	ΔV_O	LD1	Tj=25°C, 5mA≤I_O≤0.5A		7.0	240	mV
		LD2	Tj=25°C, 5mA≤I_O≤0.2A		4.0	120	mV
Current Dissipation	I_{CC}		Tj=25°C		3.7	6.0	mA
Current Dissipation Variation (Line)	ΔI_{CC}	LN	14.5V≤V_{IN}≤30V, I_O=0.2A			0.8	mA
Current Dissipation Variation (Load)	ΔI_{CC}	LD	5mA≤I_O≤0.35A			0.5	mA
Output Noise Voltage	V_{NO}		I_O=5mA, 10Hz≤f≤100kHz		140		ÕV
Ripple Rejection	Rr1		Tj=25°C, f=120Hz, 15V≤V_{IN}≤25V, I_O=0.1A	55	68		dB
	Rr2		Tj=25°C, f=120Hz, 15V≤V_{IN}≤25V, I_O=0.3A	55	66		dB
Dropout Voltage	Vdrop				2.0	2.5	V
Peak Output Current	I_{OP}		Tj=25°C		1.1		A
Short Circuit Current	I_{OSC}		Tj=25°C, V_{IN}=35V		0.02		A
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$		I_O=5mA, Tj=25 to 125°C		–1.6		mV/˚C
'L' Reset Output Voltage	V_{ORL}		V_O≤10.8V, I_{OR}=20mA, I_O=5mA			0.8	V
Reset Output Leakage Current	I_{RL}		V_R=35V			50	ÕA
Reset Threshold Voltage	V_{RT}		I_O=5mA	V_O–0.72	V_O–0.48		V
Reset Hysteresis Voltage	V_{RTH}		I_O=5mA		240		mV
Reset Output Delay Time	t_d		Cd=0.1ÕF, I_O=5mA		10		ms

Specified Application Circuit

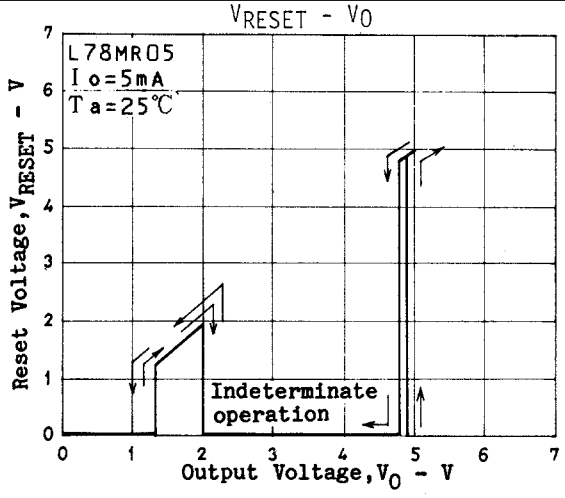


Note on use) If a load current (in particular, pulse-like load current) that is greater than a rated value is used, a reset signal may be generated due to the overload. Please keep it in mind.

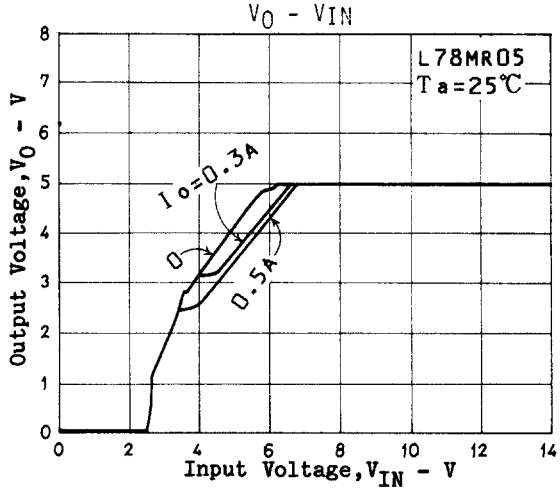
L78MR05 Reset Operation



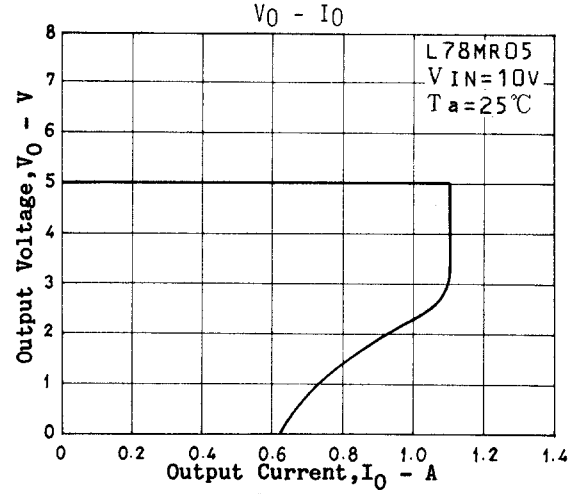
V_{RESET} - V_O



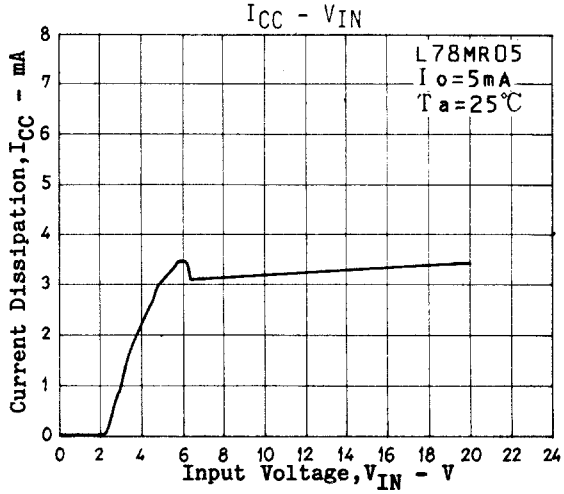
V_O - V_{IN}



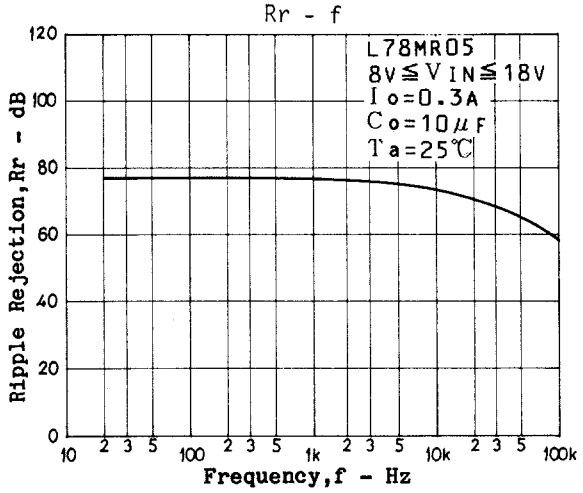
V_O - I_O



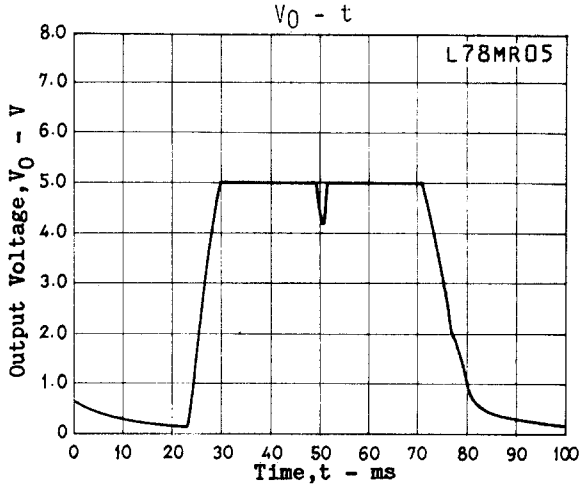
I_{CC} - V_{IN}



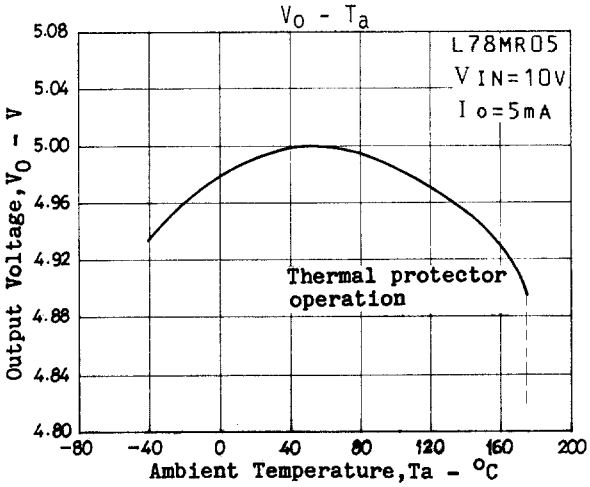
Rr - f



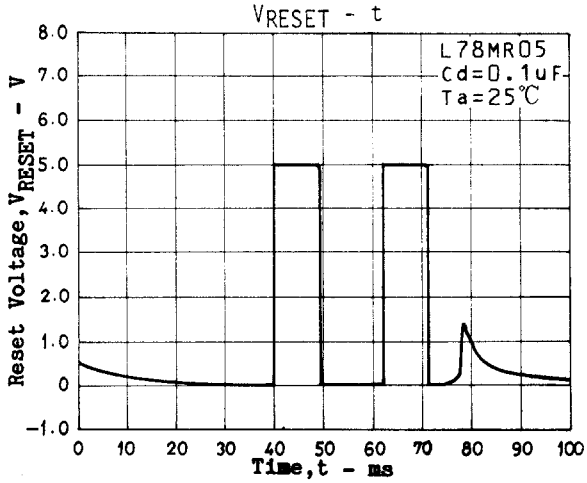
V_O - t



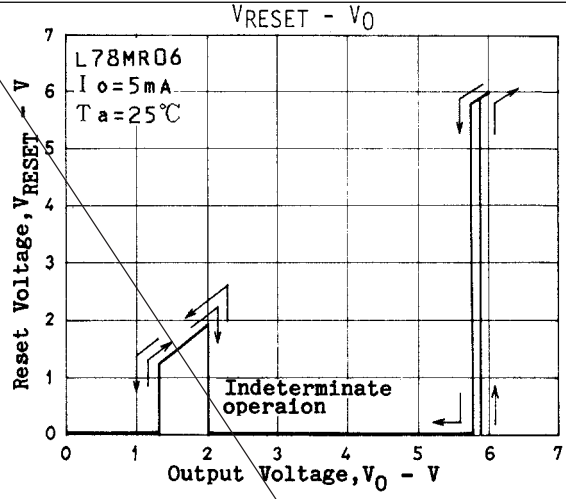
V_O - T_a



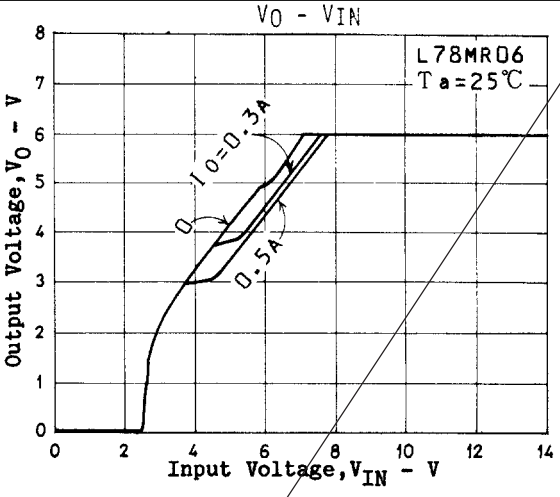
V_{RESET} - t



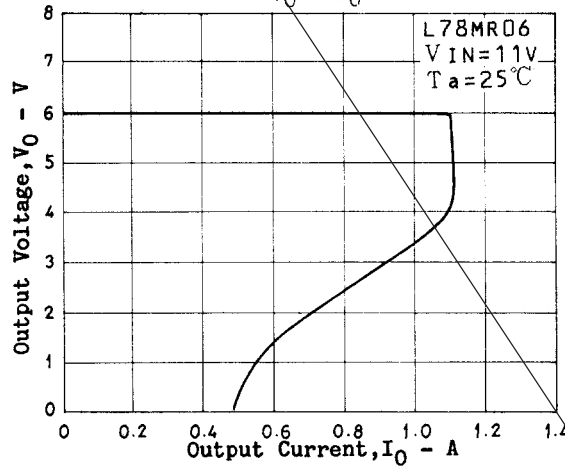
V_{RESET} - V_O



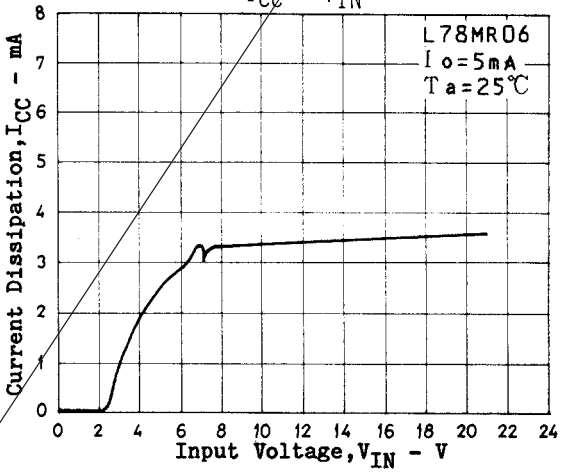
V_O - V_{IN}



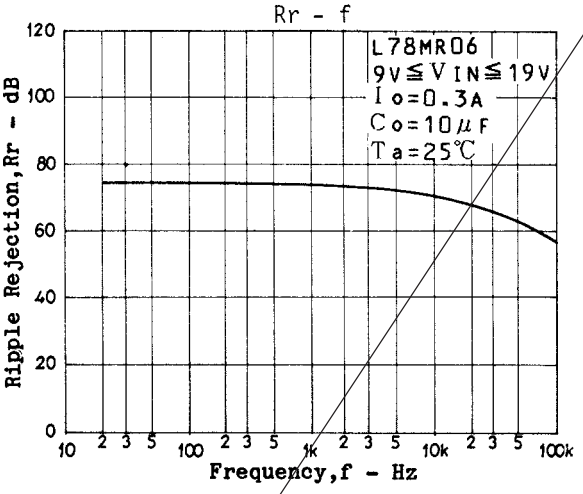
V_O - I_O



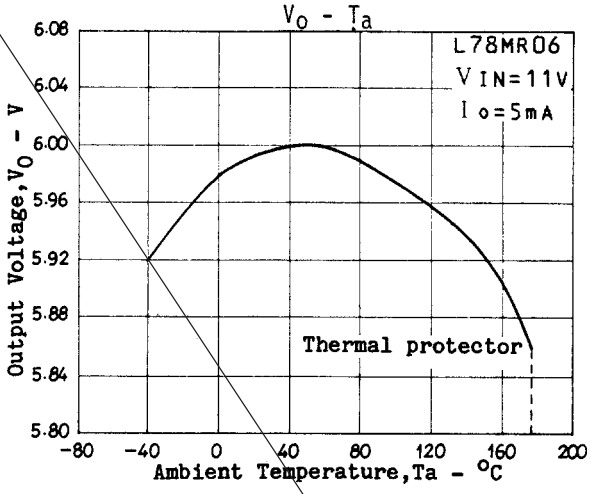
I_{CC} - V_{IN}



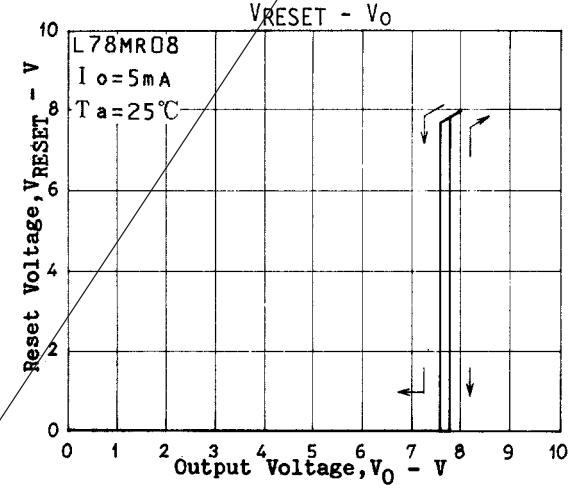
Rr - f



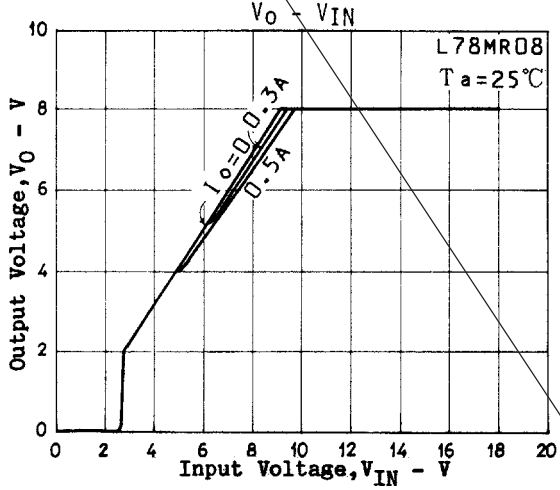
V_O - T_a



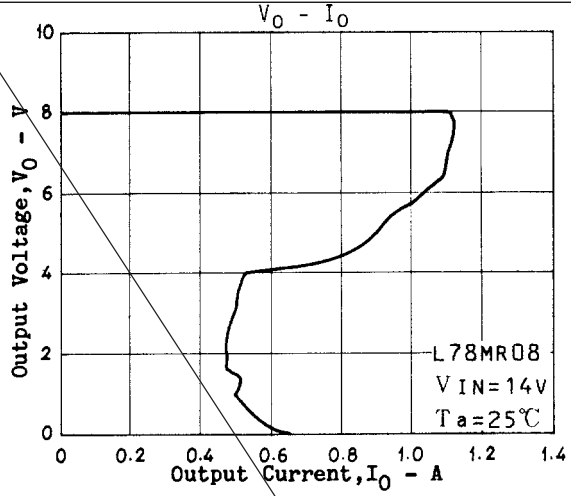
V_{RESET} - V_O



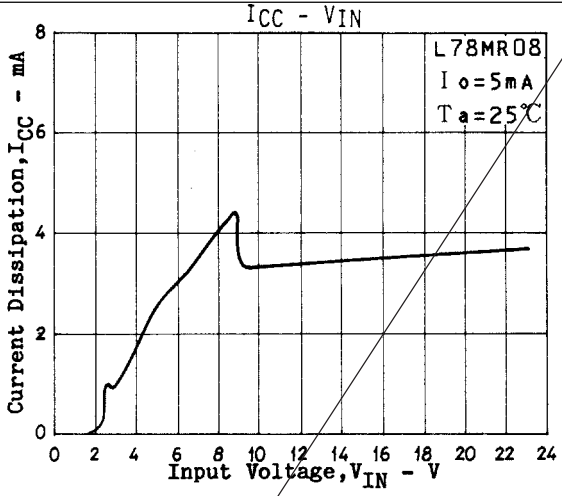
V_O - V_{IN}



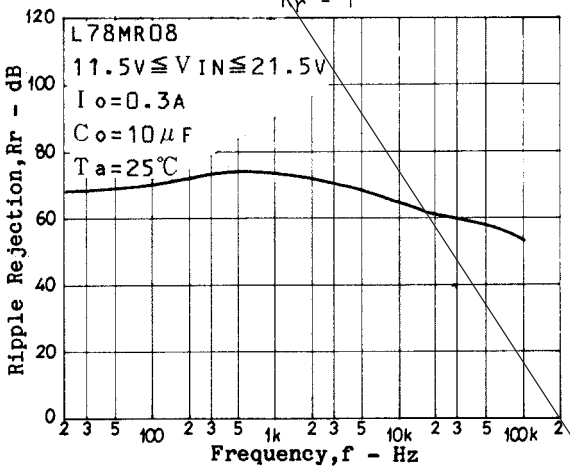
$V_O - I_O$



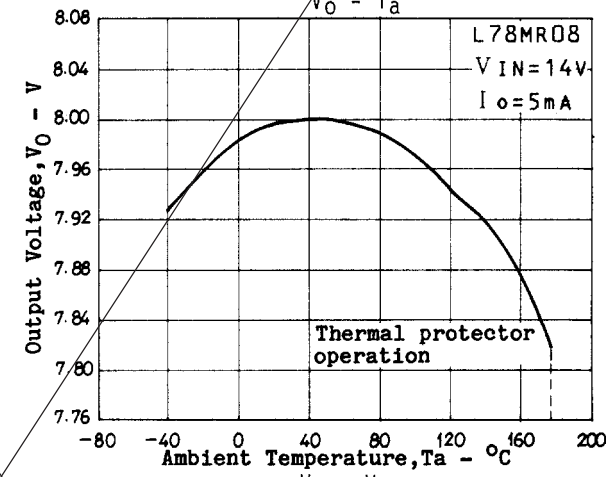
$I_{CC} - V_{IN}$



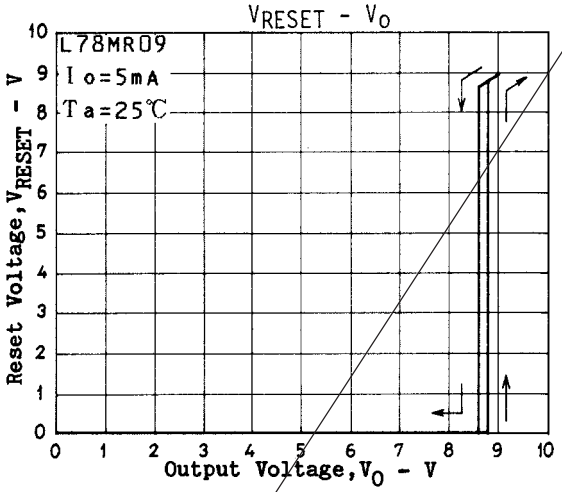
$R_r - f$



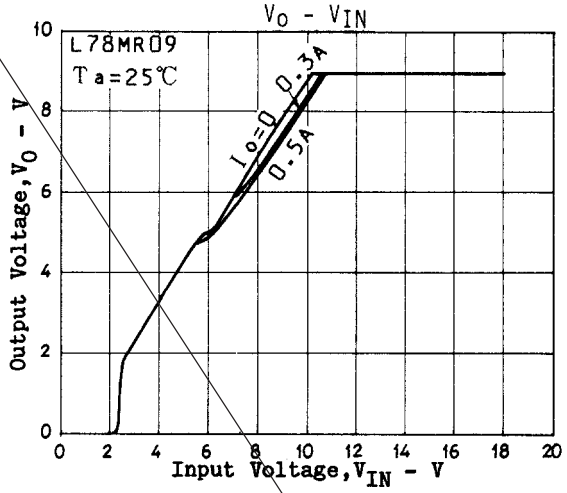
$V_O - T_a$



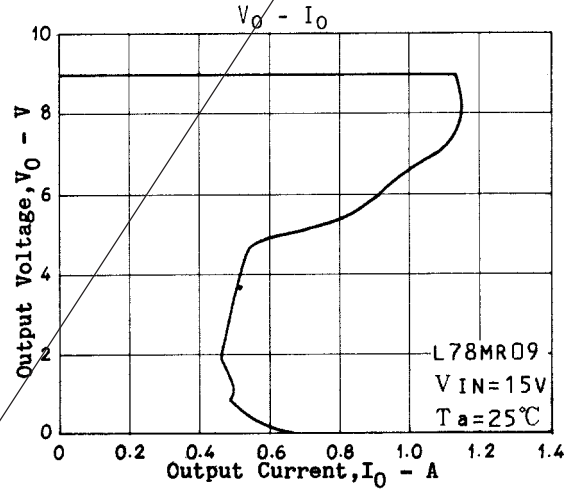
$V_{RESET} - V_O$



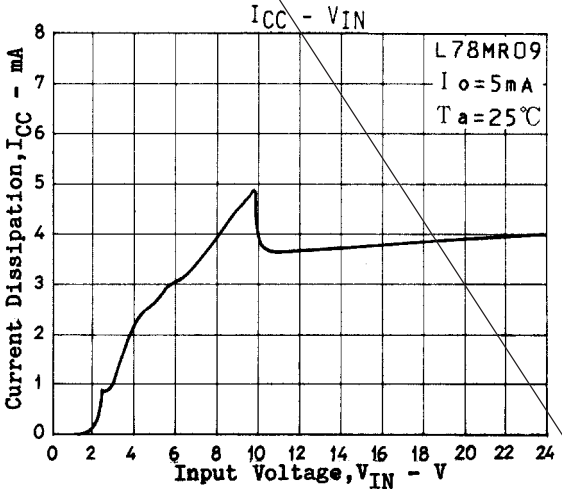
$V_O - V_{IN}$

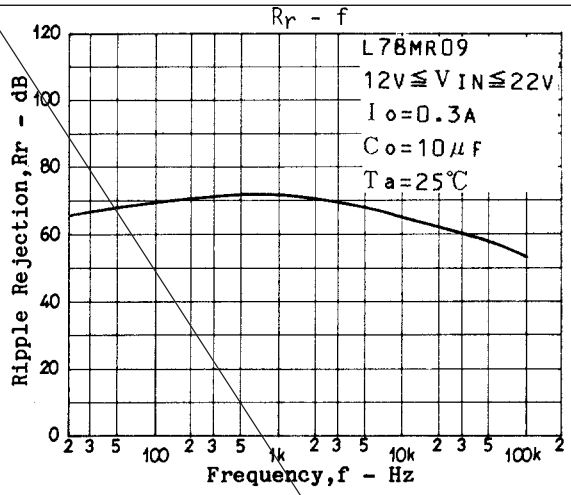


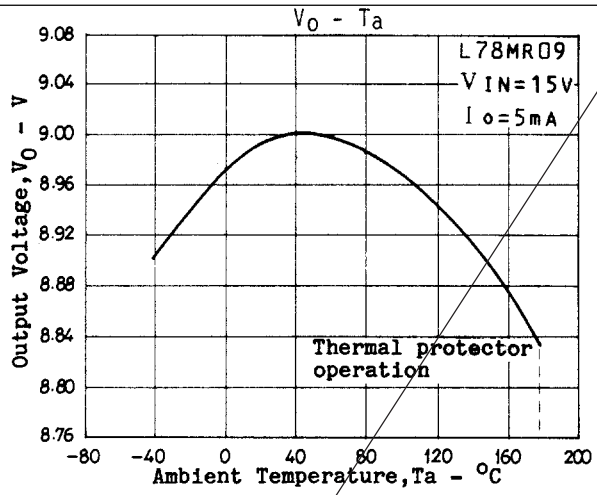
$V_O - I_O$



$I_{CC} - V_{IN}$




Rr - f
L78MR09
12V≦VIN≦22V
Io=0.3A
Co=10μF
Ta=25℃
Ripple Rejection,Rr - dB
Frequency,f - Hz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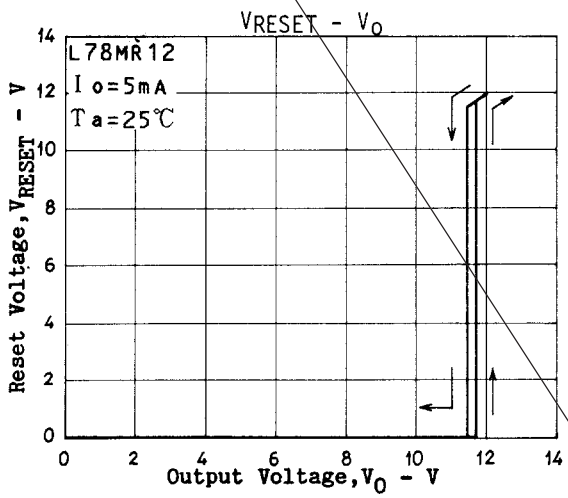
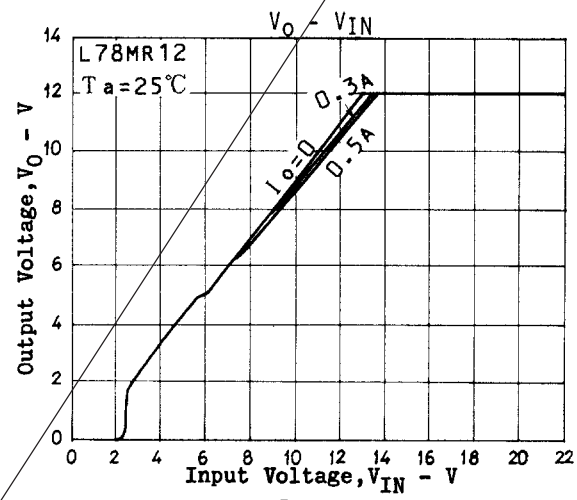
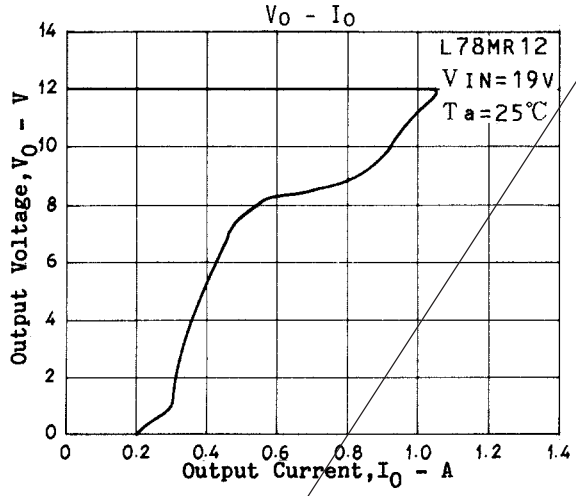
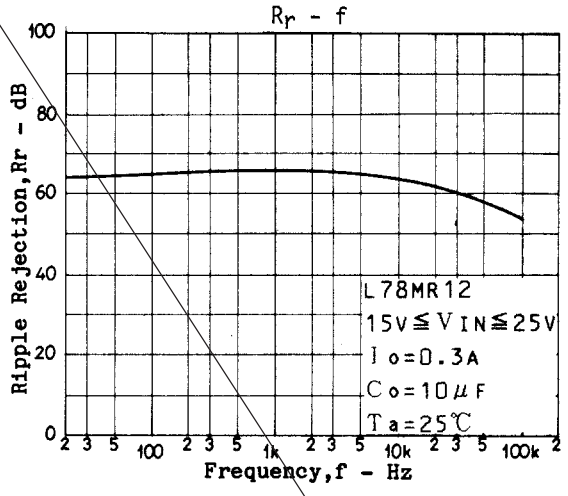
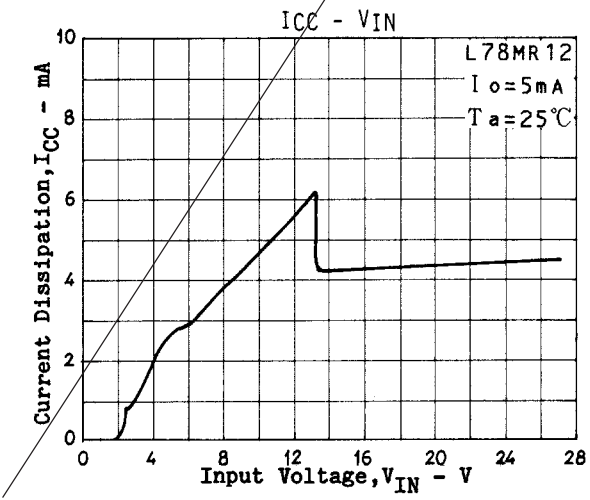
L78MR09
VIN=15V
Io=5mA
Thermal protector operation
Output Voltage,Vo - V
Ambient Temperature,Ta - °C

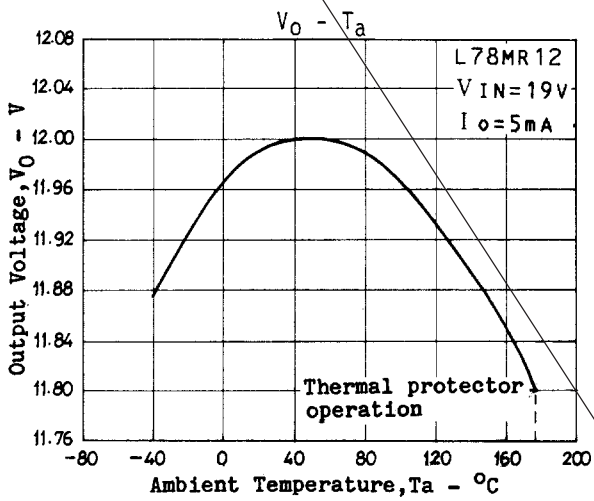

VRESET - Vo
L78MR12
Io=5mA
Ta=25℃
Reset Voltage,VRESET - V
Output Voltage,Vo - V

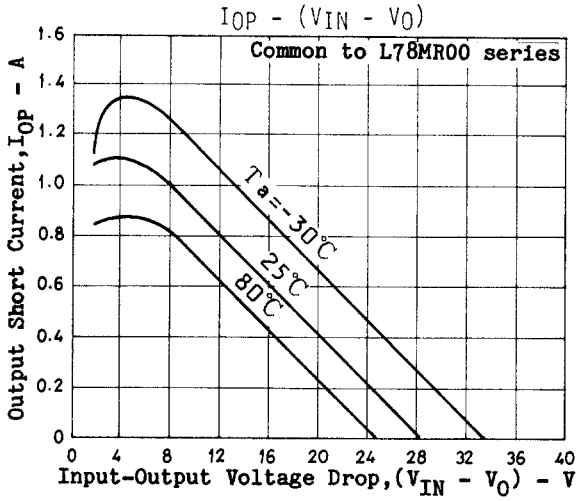

Vo - VIN
L78MR12
Ta=25℃
Io=0
0.3A
0.5A
Output Voltage,Vo - V
Input Voltage,VIN - V

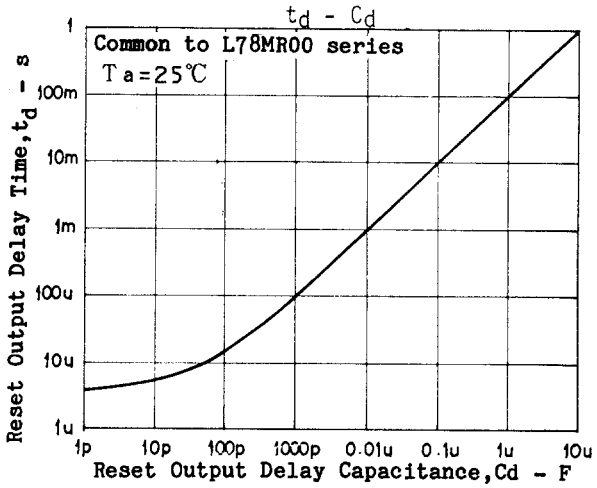

Vo - Io
L78MR12
VIN=19V
Ta=25℃
Output Voltage,Vo - V
Output Current,Io - A

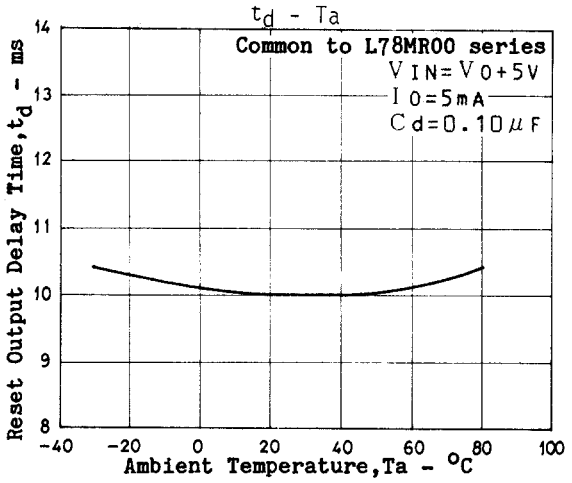

Rr - f
L78MR12
15V≦VIN≦25V
Io=0.3A
Co=10μF
Ta=25℃
Ripple Rejection,Rr - dB
Frequency,f - Hz

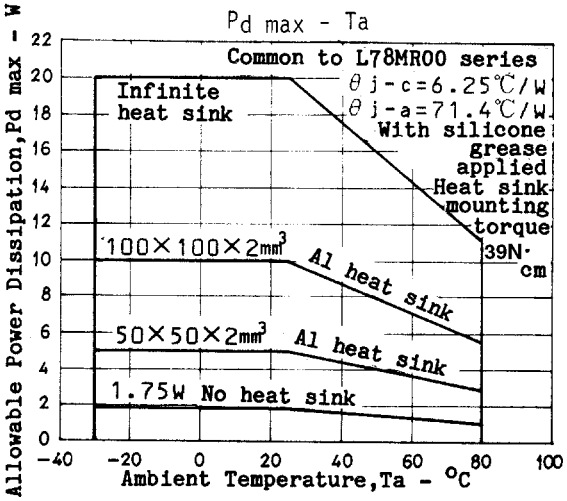

ICC - VIN
L78MR12
Io=5mA
Ta=25℃
Current Dissipation,ICC - mA
Input Voltage,VIN - V


Vo - Ta
L78MR12
VIN=19V
Io=5mA
Thermal protector operation
Output Voltage,Vo - V
Ambient Temperature,Ta - °C









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