Ordering number: EN5839

Monolithic Linear IC

L88M00T Series

3.3 to 12 V, 0.5 A Low Dropout Voltage Regulator

Overview

The L88M00T Series are low dropout voltage regulator ICs with output current of 0.5 A. Because they can operate with a low input-output voltage difference, they contribute to smaller and more efficient set power supplies, and are optimum for audio-visual and office automation equipment.

Functions and Features

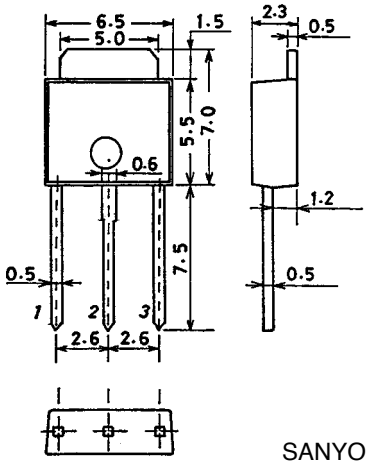
- Output voltage ~~L88M33T: 3.3 V~~ L88M05T: 5 V ~~L88M09T: 9 V~~ ~~L88M12T: 12 V~~
- 500 mA output current
- Low minimum input-output voltage differential (0.4 V typ) enables to save energy and miniaturize transformer size.
- Set size can be miniaturized with compact TP-3H power package.
- Surface mounting on board permits allowable power dissipation to be raised.
- Enhanced mount flexibility with range of formed products.

Package Dimensions

unit : mm

3103-TP-3H

[L88M00T Series]



SANYO : TP-3H

Specifications

Maximum Ratings at Ta = 25°C (common to L88M00T series)

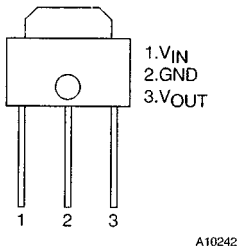
Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN} max		18	V
Allowable power dissipation	Pd max	Ta ≦ 25°C, no heat sink	1	W
		Tc = 25°C, with infinite heat sink	6.25	W
Thermal resistance (junction-atmosphere)	θj-a		125	°C/W
Thermal resistance (junction-to-case)	θj-c		20	°C/W
Operating temperature	Topr		–20 to +85	°C
Storage temperature	Tstg		–55 to +150	°C

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Pin Assignment



Top view

[L88M33T]

Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN}		4 to 17	V
Output current	I_{OUT}		0 to 500	mA

Operating Characteristics at Tj = 25 °C, V_{IN} = 6.3 V, I_O = 500 mA, C_{OUT} = 100 μF, C_{IN} = 1 μF, see specified Test Circuit.

Parameter	Symbol	Conditions	min	typ	max	Unit
Output voltage	V_{OUT}		3.2	3.3	3.4	V
Dropout voltage	V_{DROP1}			0.4	0.6	V
	V_{DROP2}	I_O = 150 mA		0.2	0.3	V
Line regulation	ΔV_{OLN}	4 V ≦ V_{IN} ≦ 17 V		10	50	mV
Load regulation	ΔV_{OLD}	5 mA ≦ I_{OUT} ≦ 500 mA		24	80	mV
Peak output current	I_{OP}		600	900		mA
Output short-circuit current	I_{OSC}			100	300	mA
Quiescent current	I_{Q1}	I_{OUT} = 0		1.9	5.0	mA
	I_{Q2}			24	50	mA
Output noise voltage	V_{NO}	10 Hz ≦ f ≦ 100 kHz		30		μVrms
Temperature coefficient of output voltage	$\Delta V_{OUT}/\Delta Tj$	Tj = 25 to 125 °C		±0.4		mV/°C
Ripple rejection	Rrej	f = 120 Hz, 4.3 V ≦ V_{IN} ≦ 17 V		65		dB

[L88M05T]

Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN}		5.8 to 17	V
Output current	I_{OUT}		0 to 500	mA

Operating Characteristics at Tj = 25 °C, V_{IN} = 8 V, I_O = 500 mA, C_{OUT} = 100 μF, C_{IN} = 1 μF, see specified Test Circuit.

Parameter	Symbol	Conditions	min	typ	max	Unit
Output voltage	V_{OUT}		4.85	5.0	5.15	V
Dropout voltage	V_{DROP1}			0.4	0.6	V
	V_{DROP2}	I_O = 150 mA		0.2	0.3	V
Line regulation	ΔV_{OLN}	5.8 V ≦ V_{IN} ≦ 17 V		10	50	mV
Load regulation	ΔV_{OLD}	5 mA ≦ I_{OUT} ≦ 500 mA		30	100	mV
Peak output current	I_{OP}		600	900		mA
Output short-circuit current	I_{OSC}			100	300	mA
Quiescent current	I_{Q1}	I_{OUT} = 0		2.0	5.0	mA
	I_{Q2}			24	50	mA
Output noise voltage	V_{NO}	10 Hz ≦ f ≦ 100 kHz		40		μVrms
Temperature coefficient of output voltage	$\Delta V_{OUT}/\Delta Tj$	Tj = 25 to 125 °C		±0.5		mV/°C
Ripple rejection	Rrej	f = 120 Hz, 6 V ≦ V_{IN} ≦ 17 V		65		dB

[L88M09T]

Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN}		9.9 to 17	V
Output current	I_{OUT}		0 to 500	mA

Operating Characteristics at Tj = 25 °C, V_{IN} = 12 V, I_O = 500 mA, C_{OUT} = 100 μF, C_{IN} = 1 μF, see specified Test Circuit.

Parameter	Symbol	Conditions	min	typ	max	Unit
Output voltage	V_{OUT}		8.73	9.0	9.27	V
Dropout voltage	V_{DROP1}			0.4	0.6	V
	V_{DROP2}	I_O = 150 mA		0.2	0.3	V
Line regulation	ΔV_{OLN}	9.9 V ≦ V_{IN} ≦ 17 V		10	50	mV
Load regulation	ΔV_{OLD}	5 mA ≦ I_{OUT} ≦ 500 mA		54	180	mV
Peak output current	I_{OP}		600	900		mA
Output short-circuit current	I_{OSC}			100	300	mA
Quiescent current	I_{Q1}	I_{OUT} = 0		2.3	5.0	mA
	I_{Q2}			24	50	mA
Output noise voltage	V_{NO}	10 Hz ≦ f ≦ 100 kHz		40		μVrms
Temperature coefficient of output voltage	$\Delta V_{OUT}/\Delta Tj$	Tj =25 to 125 °C		±0.9		mV/°C
Ripple rejection	Rrej	f = 120 Hz, 10 V ≦ V_{IN} ≦ 17 V		59		dB

[L88M12T]

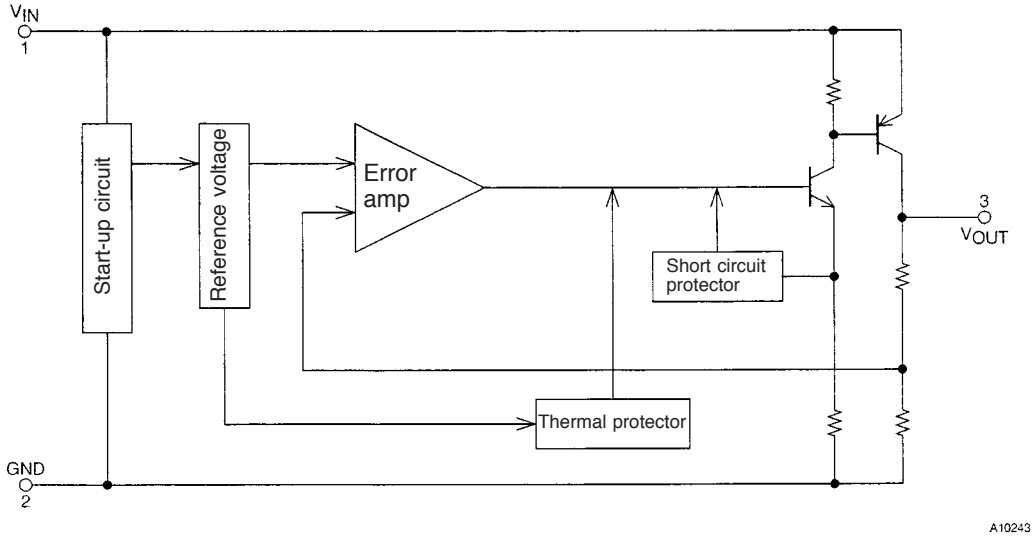
Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN}		13 to 17	V
Output current	I_{OUT}		0 to 500	mA

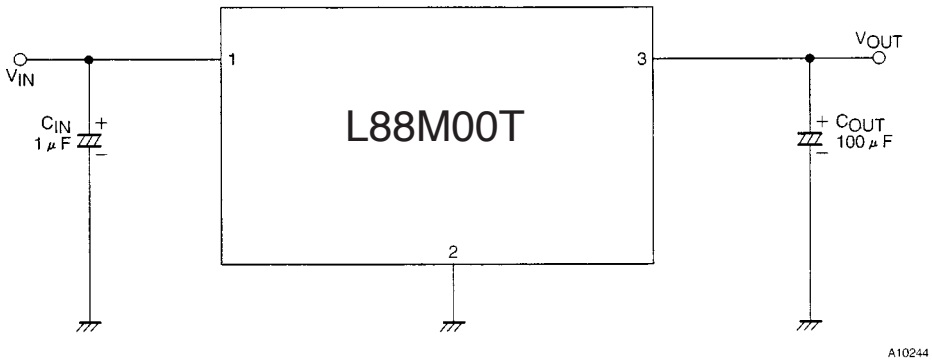
Operating Characteristics at Tj = 25 °C, V_{IN} = 15 V, I_O = 500 mA, C_{OUT} = 100 μF, C_{IN} = 1 μF, see specified Test Circuit.

Parameter	Symbol	Conditions	min	typ	max	Unit
Output voltage	V_{OUT}		11.64	12.0	12.36	V
Dropout voltage	V_{DROP1}			0.4	0.6	V
	V_{DROP2}	I_O = 150 mA		0.2	0.3	V
Line regulation	ΔV_{OLN}	13 V ≦ V_{IN} ≦ 17 V		10	50	mV
Load regulation	ΔV_{OLD}	5 mA ≦ I_{OUT} ≦ 500 mA		70	240	mV
Peak output current	I_{OP}		600	900		mA
Output short-circuit current	I_{OSC}			100	300	mA
Quiescent current	I_{Q1}	I_{OUT} = 0		2.6	5.0	mA
	I_{Q2}			24	50	mA
Output noise voltage	V_{NO}	10 Hz ≦ f ≦ 100 kHz		40		μVrms
Temperature coefficient of output voltage	$\Delta V_{OUT}/\Delta Tj$	Tj = 25 to 125 °C		±1.2		mV/°C
Ripple rejection	Rrej	f = 120 Hz, 13 V ≦ V_{IN} ≦ 17 V		58		dB

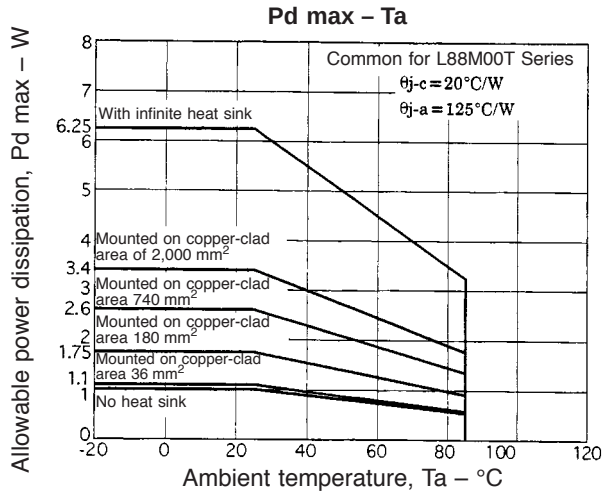
Equivalent Circuit Block Diagram (Common to L88M00T Series)



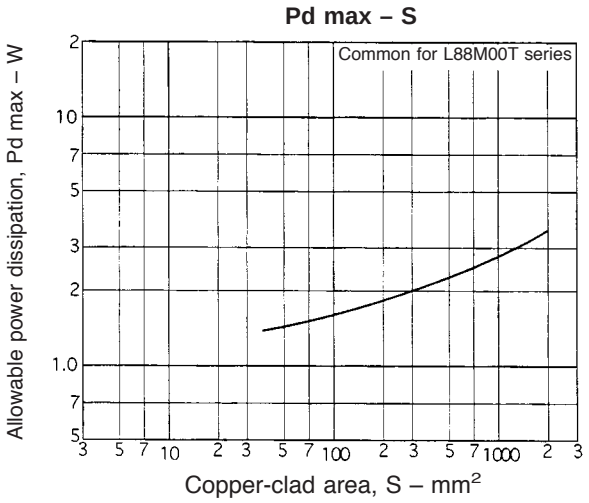
Test Circuit (Common to L88M00T Series)

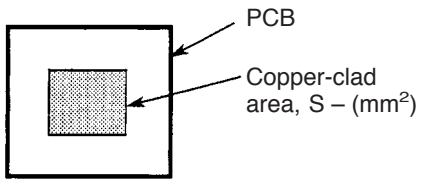


Notes: 1. To ensure operational stability, C_{IN} and C_{OUT} should be placed as close to the IC as possible.
2. Because the output capacitor C_{OUT} is set at over 100 μF to prevent oscillation at low temperatures, a capacitor that exhibits little change in capacity with temperature variations should be used (such as a tantalum capacitor).
3. When V_{IN} is minus (–) and GND is plus (+) (reversed connection), excessive current flow will occur.



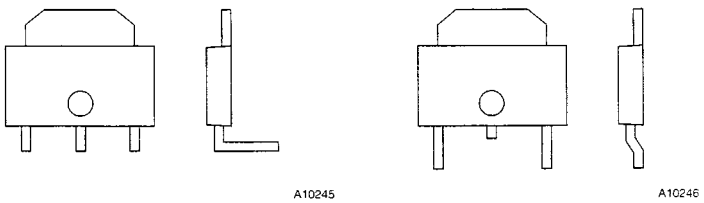
1) The allowable power dissipation is 1.0 W (Ta = 25°C) with no fin attached, but when mounted on a hybrid IC board or printed circuit board, high allowable power dissipation is achieved, despite the compact package.
The graph below depicts the relationship between the copper-clad area and allowable power dissipation when mounted on a glass epoxy board ($50 \times 5\,0 \times 0.8$ tmm^3) with a copper thickness of 18 μm.





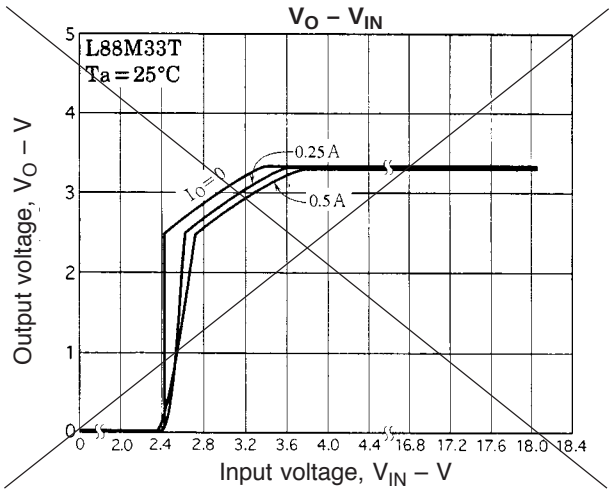
2) Pd is the value for when the solder on the surface of the IC heat sink has melted completely and the surface mount is horizontal.
3) Please be advised that the flow solder application system (full-heat method) cannot be recommended.

Lead Formings

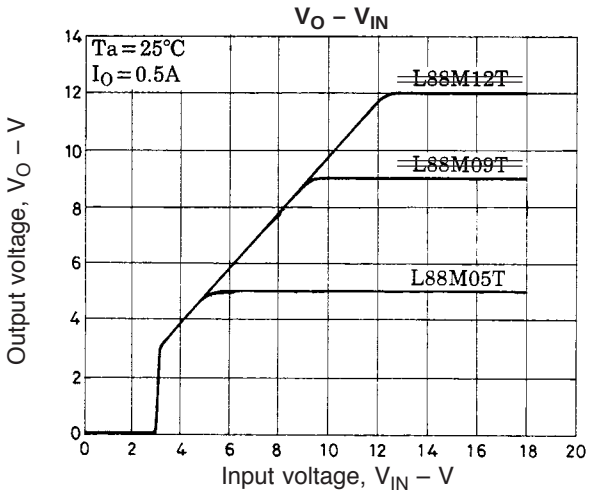


LR forming FA forming

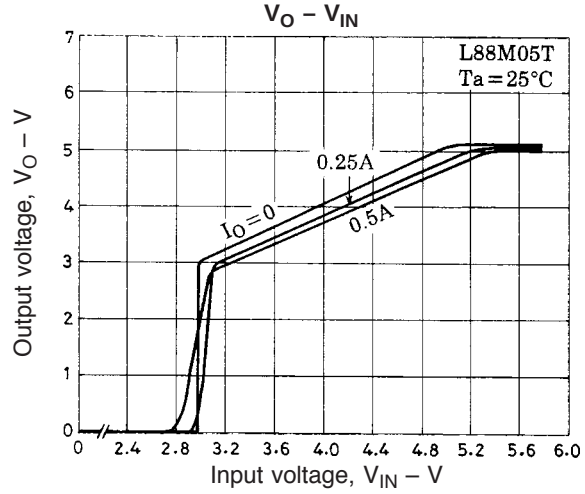
$V_O - V_{IN}$



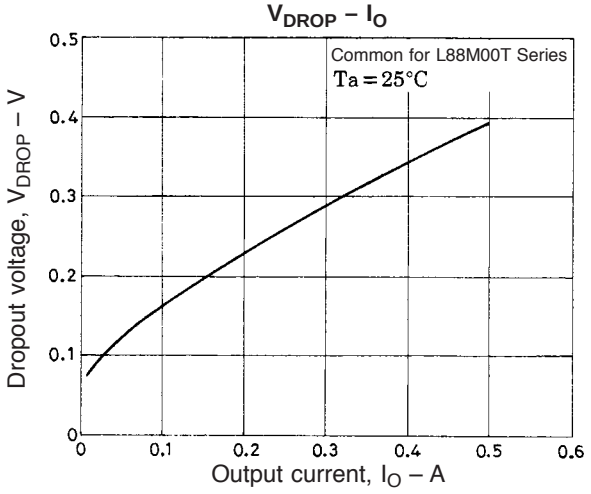
$V_O - V_{IN}$



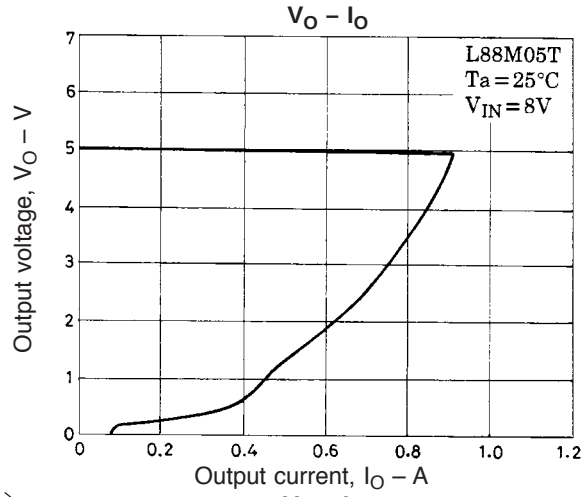
$V_O - V_{IN}$



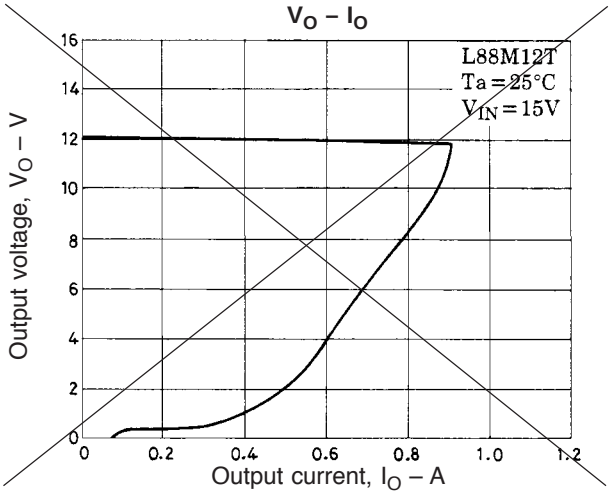
$V_{DROP} - I_O$



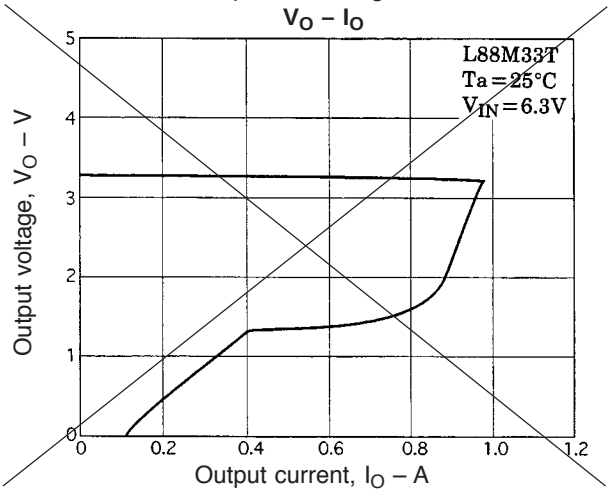
$V_O - I_O$



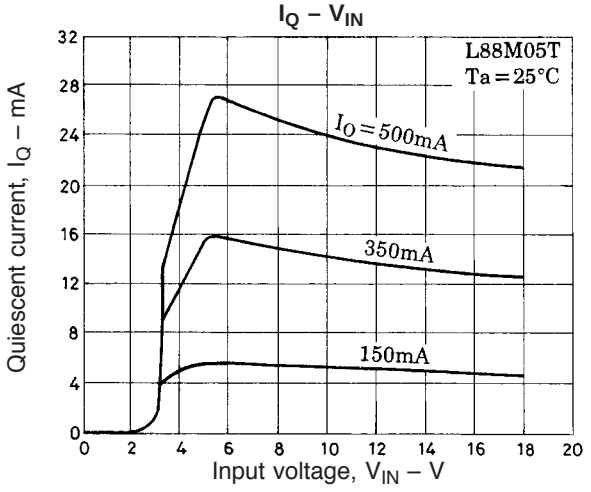
$V_O - I_O$



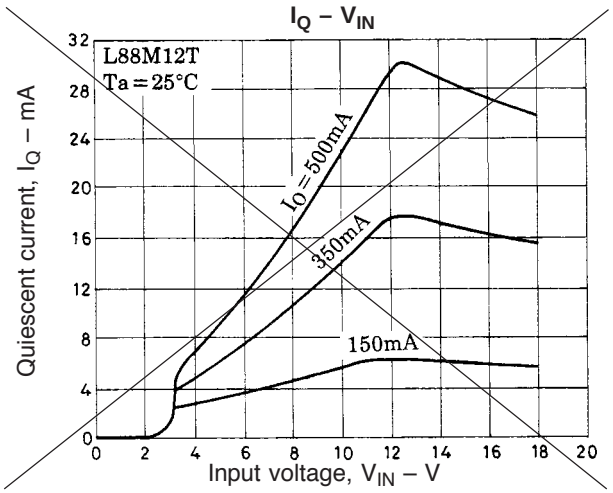
$V_O - I_O$



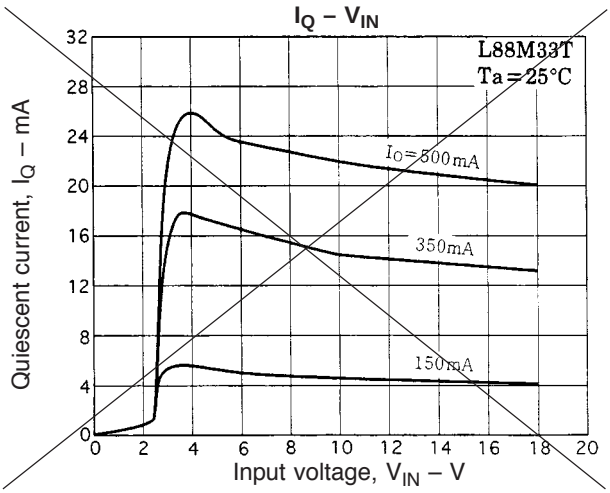
$I_Q - V_{IN}$



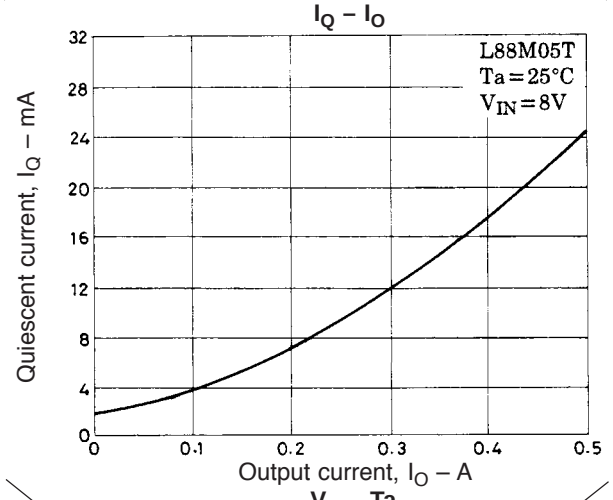
$I_Q - V_{IN}$



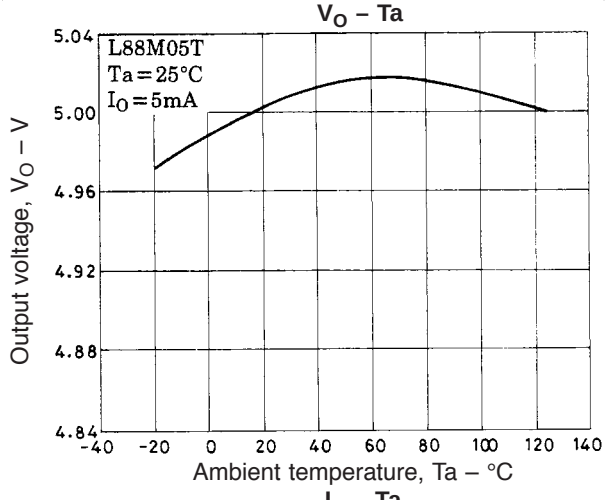
$I_Q - V_{IN}$



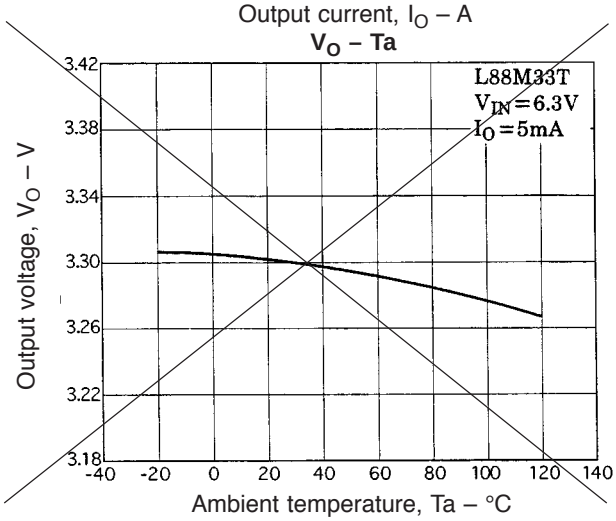
$I_Q - I_O$



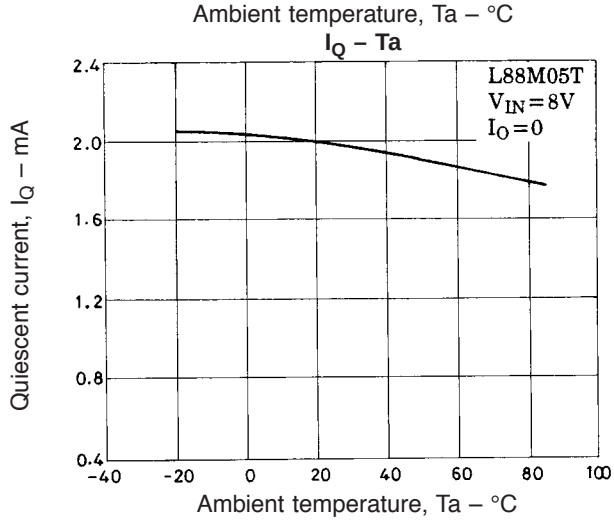
$V_O - Ta$



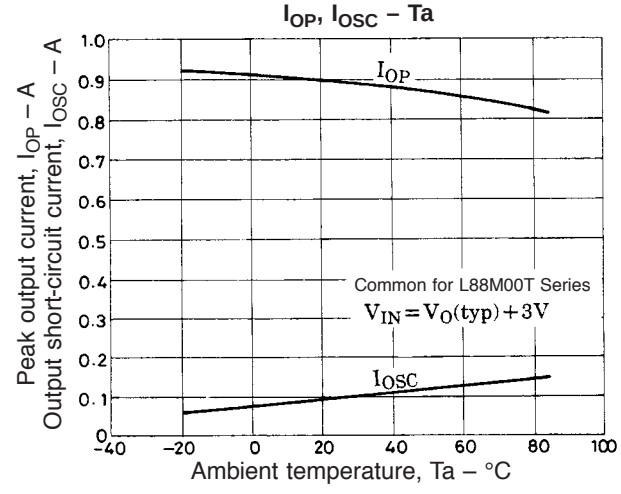
$V_O - Ta$



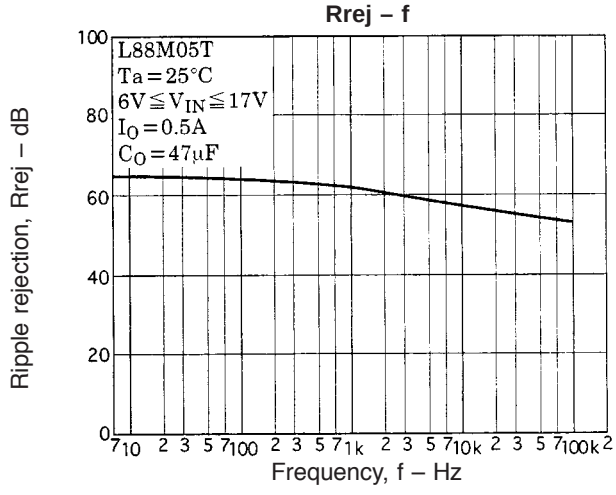
$I_Q - Ta$

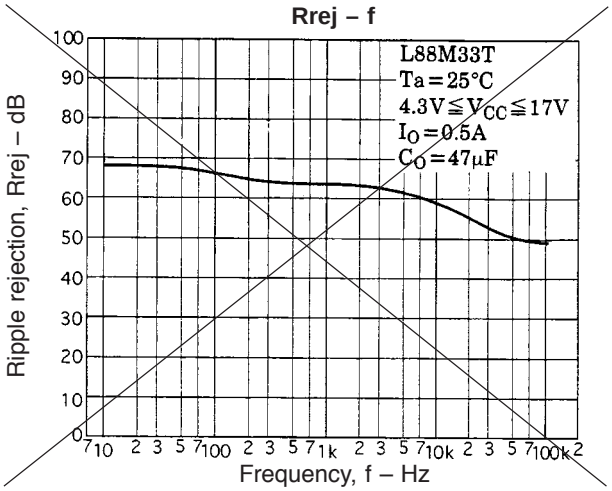


$I_{OP}, I_{OSC} - Ta$



Rrej – f





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