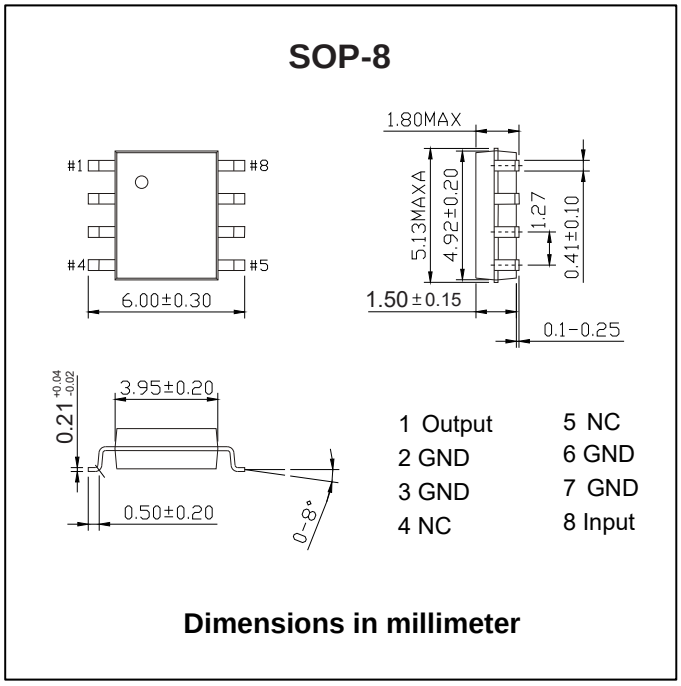
78LxxJQ

Three Terminal Positive Voltage Regulator



■ Features

- Output current up to 100mA
- Fixed output voltage of 5V, 6V, 8V, 9V, 10V, 12V, 15V and 18V available
- Thermal overload shutdown protection
- Short circuit current limiting
- AEC−Q101 Qualified and PPAP Capable

■ Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Input Voltage	V_{OUT}=5~9V	V_{IN}	30	V
	V_{OUT}=10~18V		35	
Output Current		I_{OUT}	100	mA
Power Dissipation		P_D	300	mW
Junction Temperature		T_J	150	℃
Operating Temperature		T_{OPR}	-40 to 85	
Storage Temperature		T_{stg}	-55 to 150	

Note: 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.

■ Electrical Characteristics

For 78L05JQ (V_{IN}=10V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	4.8	5	5.2	V
		7V≤V_{IN}≤20V,I_{OUT}=1mA-40mA	4.75		5.25	
		7V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	4.75		5.25	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			60	mV
		T_J=25℃,I_{OUT}=1mA-40mA			30	
Line Regulation	△V_{OUT}	7V≤V_{IN}≤20V, T_J=25℃			150	
		8V≤V_{IN}≤20V, T_J=25℃			100	
Quiescent Current	I_q	V_{IN}=10V,I_{OUT}=0mA,T_J=25°C			5.5	mA
Quiescent Current Change	△I_q	8V≤V_{IN}≤20V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		40		μV
Temperature coefficient of V_{OUT}	△V_O/△T	I_{OUT}=5mA		-0.65		mV/℃
Ripple Rejection	R_R	8V≤V_{IN}≤20V,f=120Hz,T_J=25℃	41			dB
Dropout Voltage	V_d	T_J=25℃		1.7		V

For 78L06JQ (V_{IN}=12V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	5.76	6	6.24	V
		8.5V≤V_{IN}≤20V,I_{OUT}=1mA-40mA	5.7		6.3	
		8.5V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	5.7		6.3	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			80	mV
		T_J=25℃,I_{OUT}=1mA-40mA			40	
Line Regulation	△V_{OUT}	8.5V≤V_{IN}≤20V, T_J=25℃			175	
		9V≤V_{IN}≤20V, T_J=25℃			125	
Quiescent Current	I_q	V_{IN}=12V,I_{OUT}=0mA,T_J=25°C			6	mA
Quiescent Current Change	△I_q	9V≤V_{IN}≤20V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		49		μV
Temperature coefficient of V_{OUT}	△V_O/△T	I_{OUT}=5mA		-0.75		mV/℃
Ripple Rejection	R_R	10V≤V_{IN}≤20V,f=120Hz,T_J=25℃	40			dB
Dropout Voltage	V_d	T_J=25℃		1.7		V

For 78L08JQ (V_{IN}=14V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	7.68	8	8.32	V
		10.5V≤V_{IN}≤23V,I_{OUT}=1mA-40mA	7.6		8.4	
		10.5V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	7.6		8.4	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			80	mV
		T_J=25℃,I_{OUT}=1mA-40mA			40	
Line Regulation	△V_{OUT}	10.5V≤V_{IN}≤23V, T_J=25℃			175	
		11V≤V_{IN}≤23V, T_J=25℃			125	
Quiescent Current	I_q	V_{IN}=14V,I_{OUT}=0mA,T_J=25°C			5.5	mA
Quiescent Current Change	△I_q	11V≤V_{IN}≤23V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		49		μV
Temperature coefficient of V_{OUT}	△Vo/△T	I_{OUT}=5mA		-0.75		mV/℃
Ripple Rejection	RR	11V≤V_{IN}≤23V,f=120Hz,T_J=25℃	39			dB
Dropout Voltage	V_d	T_J=25℃		1.7		V

For 78L09JQ (V_{IN}=15V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	8.64	9	9.36	V
		11.5V≤V_{IN}≤24V,I_{OUT}=1mA-40mA	8.55		9.45	
		11.5V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	8.55		9.45	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			90	mV
		T_J=25℃,I_{OUT}=1mA-40mA			40	
Line Regulation	△V_{OUT}	11.5V≤V_{IN}≤24V, T_J=25℃			200	
		13V≤V_{IN}≤24V, T_J=25℃			150	
Quiescent Current	I_q	V_{IN}=15V,I_{OUT}=0mA,T_J=25°C			6	mA
Quiescent Current Change	△I_q	13V≤V_{IN}≤24V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		70		μV
Temperature coefficient of V_{OUT}	△Vo/△T	I_{OUT}=5mA		-0.75		mV/℃
Ripple Rejection	RR	12V≤V_{IN}≤24V,f=120Hz,T_J=25℃	38			dB
Dropout Voltage	V_d	T_J=25℃		1.7		V

For 78L10JQ (V_{IN}=16V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	9.6	10	10.4	V
		12.5V≤V_{IN}≤25V,I_{OUT}=1mA-40mA	9.5		10.5	
		12.5V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	9.5		10.5	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			90	mV
		T_J=25℃,I_{OUT}=1mA-40mA			40	
Line Regulation	△V_{OUT}	12.5V≤V_{IN}≤25V, T_J=25℃			200	
		14V≤V_{IN}≤25V, T_J=25℃			170	
Quiescent Current	I_q	V_{IN}=17V,I_{OUT}=0mA,T_J=25°C			6	mA
Quiescent Current Change	△I_q	12.5V≤V_{IN}≤25V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		74		μV
Temperature coefficient of V_{OUT}	△Vo/△T	I_{OUT}=5mA		-0.8		mV/℃
Ripple Rejection	R_R	15V≤V_{IN}≤25V,f=120Hz,T_J=25℃	38			dB
Dropout Voltage	V_d	T_J=25℃		1.7		V

For 78L12JQ (V_{IN}=19V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	11.52	12	12.48	V
		14.5V≤V_{IN}≤27V,I_{OUT}=1mA-40mA	11.4		12.6	
		14.5V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	11.4		12.6	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			100	mV
		T_J=25℃,I_{OUT}=1mA-40mA			50	
Line Regulation	△V_{OUT}	14.5V≤V_{IN}≤27V, T_J=25℃			300	
		16V≤V_{IN}≤27V, T_J=25℃			250	
Quiescent Current	I_q	V_{IN}=19V,I_{OUT}=0mA,T_J=25°C			6	mA
Quiescent Current Change	△I_q	16V≤V_{IN}≤27V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		80		μV
Temperature coefficient of V_{OUT}	△Vo/△T	I_{OUT}=5mA		-1		mV/℃
Ripple Rejection	R_R	15V≤V_{IN}≤25V,f=120Hz,T_J=25℃	37			dB
Dropout Voltage	V_d	T_J=25℃		1.7		V

For 78L15JQ (V_{IN}=23V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	14.4	15	15.6	V
		17.5V≤V_{IN}≤30V,I_{OUT}=1mA-40mA	14.25		15.75	
		17.5V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	14.25		15.75	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			150	mV
		T_J=25℃,I_{OUT}=1mA-40mA			75	
Line Regulation	△V_{OUT}	17.5V≤V_{IN}≤30V, T_J=25℃			150	
		20V≤V_{IN}≤30V, T_J=25℃			75	
Quiescent Current	I_q	V_{IN}=23V,I_{OUT}=0mA,T_J=25°C			6.5	mA
Quiescent Current Change	△I_q	20V≤V_{IN}≤30V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		90		μV
Temperature coefficient of V_{OUT}	△Vo/△T	I_{OUT}=5mA		-1.3		mV/℃
Ripple Rejection	R_R	18.5V≤V_{IN}≤28.5V,f=120Hz,T_J=25℃	34			dB
Dropout Voltage	Vd	T_J=25℃		1.7		V

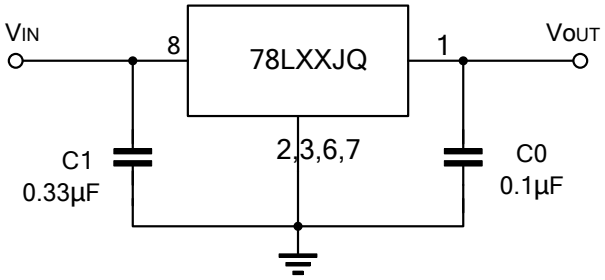
For 78L18JQ (V_{IN}=27V, I_{OUT}=40mA, 0℃<T_J<150℃, C1=0.33μF, Co=0.1μF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	T_J=25℃	17.64	18	18.36	V
		21V≤V_{IN}≤33V,I_{OUT}=1mA-40mA	17.46		18.54	
		21V≤V_{IN}≤V_{MAX},I_{OUT}=1mA-70mA (note 2)	17.46		18.54	
Load Regulation	△V_{OUT}	T_J=25℃,I_{OUT}=1mA-100mA			180	mV
		T_J=25℃,I_{OUT}=1mA-40mA			90	
Line Regulation	△V_{OUT}	21V≤V_{IN}≤33V, T_J=25℃			300	
		22V≤V_{IN}≤33V, T_J=25℃			250	
Quiescent Current	I_q	V_{IN}=27V,I_{OUT}=0mA,T_J=25°C			6	mA
Quiescent Current Change	△I_q	21V≤V_{IN}≤33V			1.5	
		1mA≤I_{OUT}≤40mA			0.1	
Output Noise Voltage	eN	10Hz≤F≤100kHz		150		μV
Temperature coefficient of V_{OUT}	△Vo/△T	I_{OUT}=5mA		-1.8		mV/℃
Ripple Rejection	R_R	23V≤V_{IN}≤33V,f=120Hz,T_J=25℃	34			dB
Dropout Voltage	Vd	T_J=25℃		1.7		V

Note 1. The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB.

2. Power dissipation<0.5W

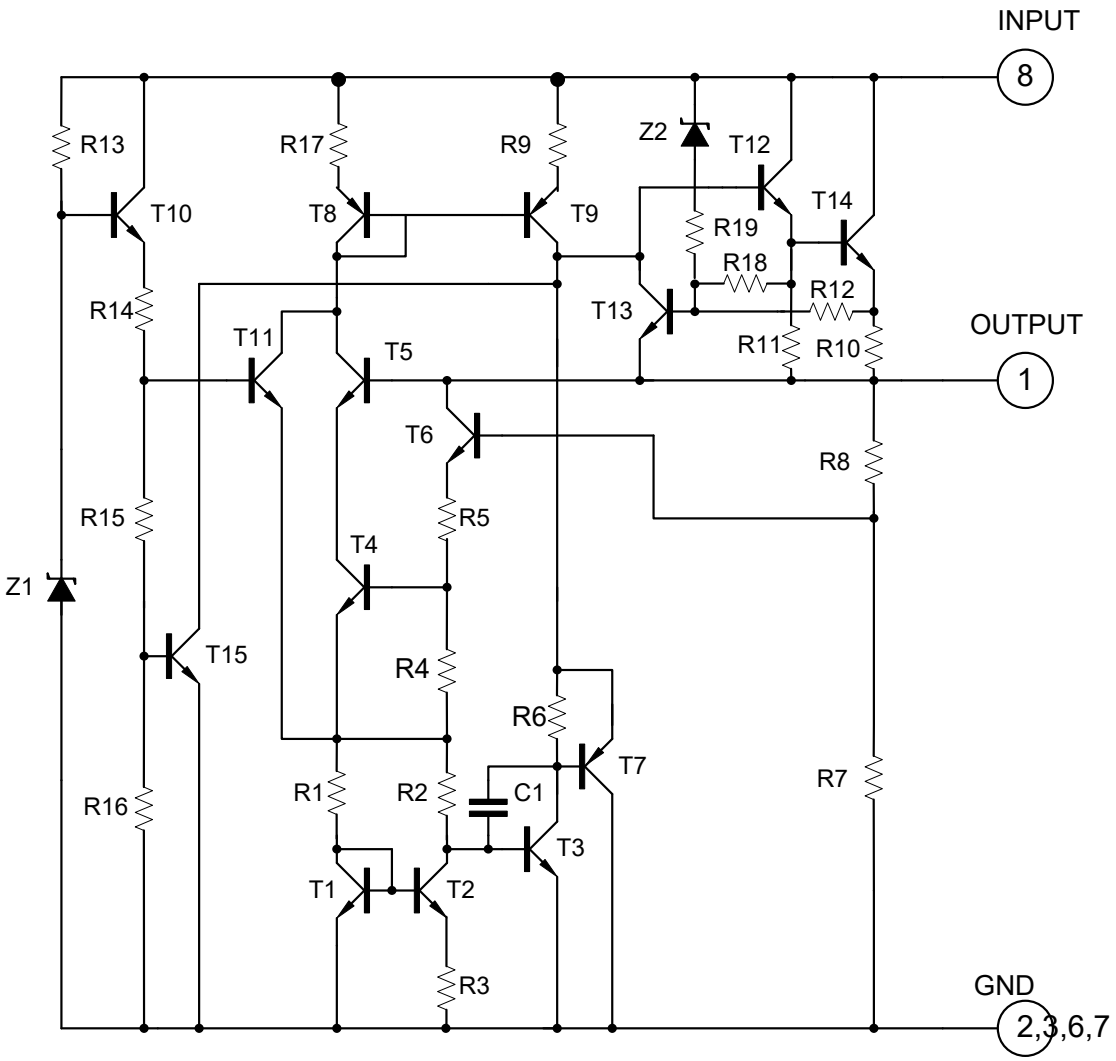
■ Application Circuit



Notes: 1. To specify an output voltage, substitute voltage value for "XX".

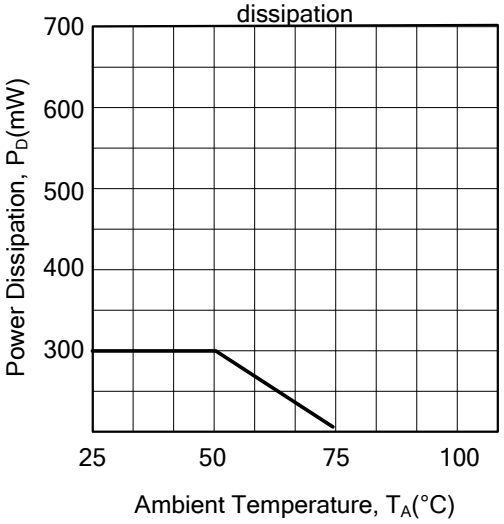
2. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

■ Test Circuit

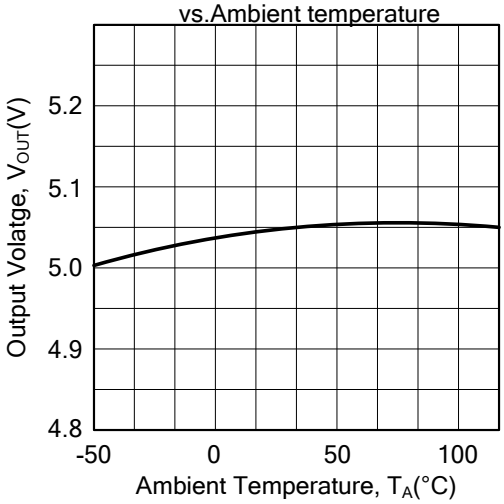


■ Typical Characterisitics

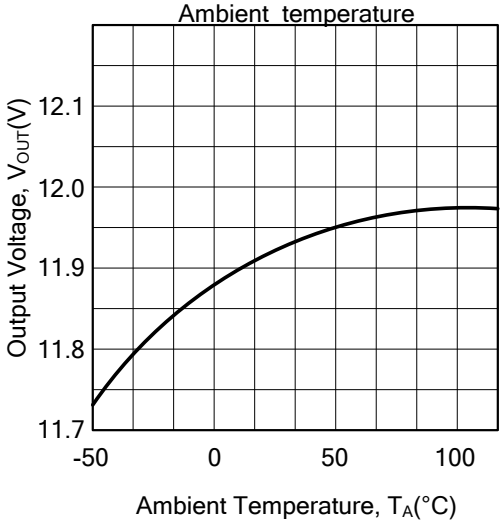
Ambient temperature vs. Power dissipation



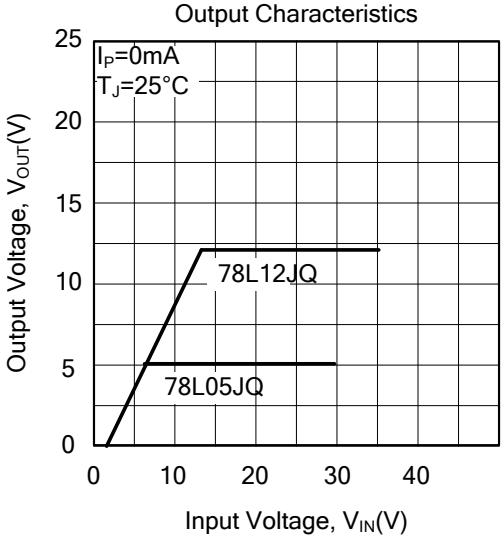
78L05JQ Output Voltage vs.Ambient temperature



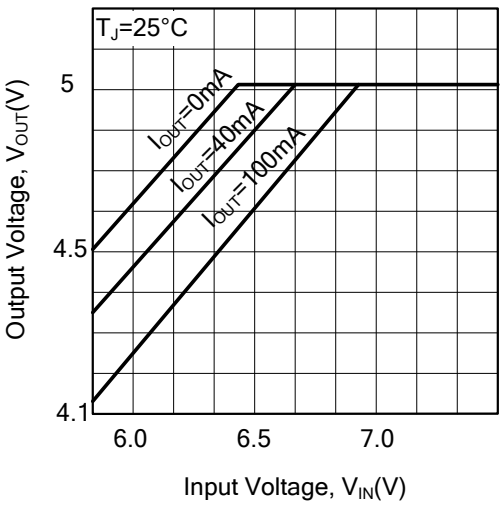
78L12JQ Output Voltage vs. Ambient temperature



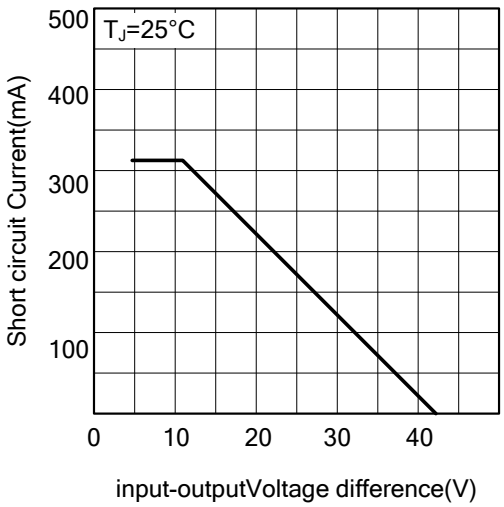
Output Characteristics



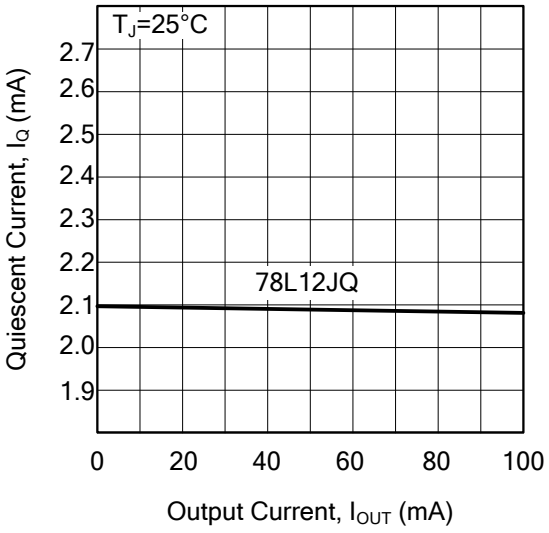
78L05JQ Dropout Characteristics



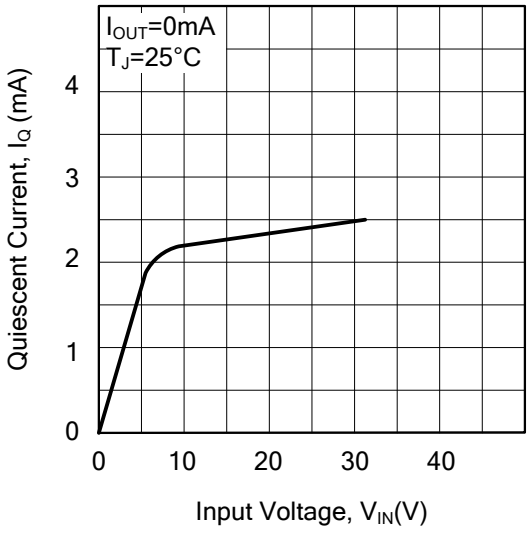
Short Circuit output current



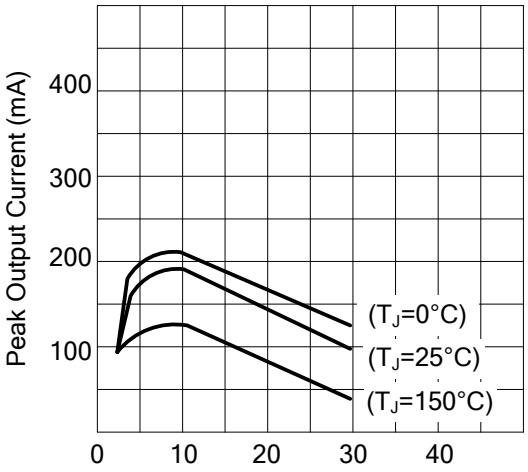
78L12JQ Quiescent Current
vs. Output Current



78L05JQ Quiescent Current
vs. Input Voltage



Peak Output Current
vs. Dropout Voltage Difference



Dropout Voltage