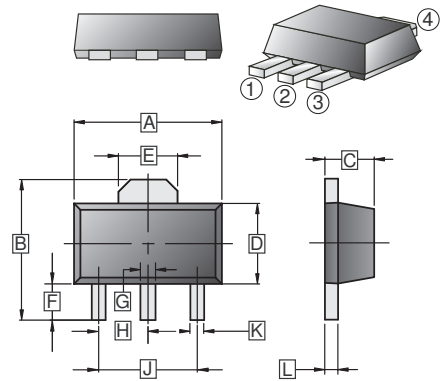


RoHS Compliant Product
 A suffix of "-C" specifies halogen or lead -free

DESCRIPTION

The SM78LXX series of positive regulators are available in the SOT-89 package and with 5V, 6V, 8V, 9V, 12V, 15V and 18V fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 100mA output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents. SM78Lxx is characterized for operation from -40°C to +125°C.

SOT-89



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.40	4.60	G	0.40	0.58
B	3.94	4.25	H	1.50 TYP	
C	1.40	1.60	J	3.00 TYP	
D	2.25	2.60	K	0.32	0.52
E	1.55 TYP.		L	0.35	0.44
F	0.89	1.20			

FEATURES

- Internal Short-Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components Required

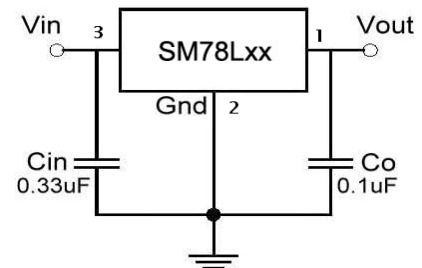
PACKAGE INFORMATION

Package	MPQ	Leader Size
SOT-89	1K	7 inch

MARKING CODE

Part Number	Marking	Part Number	Marking
SM78L05	78L05	SM78L12	78L12
SM78L06	78L06	SM78L15	78L15
SM78L08	78L08	SM78L18	78L18
SM78L09	78L09		

TYPICAL APPLICATION



MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Input Voltage	V _{IN}	5V~9V	30
		12V~18V	35
Output Current	I _o	100	mA
Operating Junction Temperature Range	T _J	-40~125	°C
Storage Temperature Range	T _{stg}	-65~150	
Power Dissipation @T _A =25°C	P _D	600	mW

SM78L05 ELECTRICAL CHARACTERISTICS ($I_o=40\text{mA}$, $V_{IN}=10\text{V}$, $C_{IN}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Symbol	Test Conditions	Min	Typ	Max	Unit	
V_o		25°C	4.85	5	5.15	V
	$7\text{V} \leq V_{IN} \leq 20\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	4.75	5	5.25	
	$1\text{mA} \leq I_o \leq 70\text{mA}$		4.75	5	5.25	
ΔV_o (Line Regulation)	$7\text{V} \leq V_{IN} \leq 20\text{V}$	0~125°C	-	32	150	mV
	$8\text{V} \leq V_{IN} \leq 20\text{V}$	25°C	-	26	100	
ΔV_o (Load Regulation)	$1\text{mA} \leq I_o \leq 100\text{mA}$	25°C	-	15	60	mV
	$1\text{mA} \leq I_o \leq 40\text{mA}$	25°C	-	8	30	
I_q		25°C	-	3.8	6	mA
ΔI_q	$1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	-	-	0.1	mA
	$8\text{V} \leq V_{IN} \leq 20\text{V}$		-	-	1.5	
V_N	$10\text{Hz} \leq f \leq 100\text{KHz}$	25°C	-	42	-	$\mu\text{V}/V_o$
RR	$8\text{V} \leq V_{IN} \leq 20\text{V}$, $f=120\text{Hz}$	0~125°C	41	49	-	dB
V_D		25°C	-	1.7	-	V

SM78L06 ELECTRICAL CHARACTERISTICS ($I_o=40\text{mA}$, $V_{IN}=11\text{V}$, $C_{IN}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Symbol	Test Conditions	Min	Typ	Max	Unit	
V_o		25°C	5.82	6	6.18	V
	$8\text{V} \leq V_{IN} \leq 20\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	5.7	6	6.3	
	$1\text{mA} \leq I_o \leq 70\text{mA}$		5.7	6	6.3	
ΔV_o (Line Regulation)	$8\text{V} \leq V_{IN} \leq 20\text{V}$	25°C	-	35	175	mV
	$9\text{V} \leq V_{IN} \leq 20\text{V}$	25°C	-	29	125	
ΔV_o (Load Regulation)	$1\text{mA} \leq I_o \leq 100\text{mA}$	25°C	-	16	80	mV
	$1\text{mA} \leq I_o \leq 40\text{mA}$	25°C	-	9	40	
I_q		25°C	-	3.9	6	mA
ΔI_q	$1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	-	-	0.1	mA
	$9\text{V} \leq V_{IN} \leq 20\text{V}$		-	-	1.5	
V_N	$10\text{Hz} \leq f \leq 100\text{KHz}$	25°C	-	46	-	$\mu\text{V}/V_o$
RR	$9\text{V} \leq V_{IN} \leq 19\text{V}$, $f=120\text{Hz}$	0~125°C	40	48	-	dB
V_D		25°C	-	1.7	-	V

SM78L08 ELECTRICAL CHARACTERISTICS ($I_o=40\text{mA}$, $V_{IN}=14\text{V}$, $C_{IN}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Symbol	Test Conditions		Min	Typ	Max	Unit
V_o		25°C	7.76	8	8.24	V
	$10.5\text{V} \leq V_{IN} \leq 23\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	7.6	8	8.4	
	$1\text{mA} \leq I_o \leq 70\text{mA}$		7.6	8	8.4	
ΔV_o (Line Regulation)	$10.5\text{V} \leq V_{IN} \leq 23\text{V}$	25°C	-	42	175	mV
	$11\text{V} \leq V_{IN} \leq 23\text{V}$	25°C	-	36	125	
ΔV_o (Load Regulation)	$1\text{mA} \leq I_o \leq 100\text{mA}$	25°C	-	18	80	mV
	$1\text{mA} \leq I_o \leq 40\text{mA}$	25°C	-	10	40	
I_q		25°C	-	4	6	mA
ΔI_q	$1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	-	-	0.1	mA
	$11\text{V} \leq V_{IN} \leq 23\text{V}$		-	-	1.5	
V_N	$10\text{Hz} \leq f \leq 100\text{KHz}$	25°C	-	54	-	$\mu\text{V}/V_o$
RR	$13\text{V} \leq V_{IN} \leq 23\text{V}$, $f=120\text{Hz}$	0~125°C	37	46	-	dB
V_D		25°C	-	1.7	-	V

SM78L09 ELECTRICAL CHARACTERISTICS ($I_o=40\text{mA}$, $V_{IN}=16\text{V}$, $C_{IN}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Symbol	Test Conditions		Min	Typ	Max	Unit
V_o		25°C	8.73	9	9.27	V
	$12\text{V} \leq V_{IN} \leq 24\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	8.55	9	9.45	
	$1\text{mA} \leq I_o \leq 70\text{mA}$		8.55	9	9.45	
ΔV_o (Line Regulation)	$12\text{V} \leq V_{IN} \leq 24\text{V}$	25°C	-	45	175	mV
	$13\text{V} \leq V_{IN} \leq 24\text{V}$	25°C	-	40	125	
ΔV_o (Load Regulation)	$1\text{mA} \leq I_o \leq 100\text{mA}$	25°C	-	19	90	mV
	$1\text{mA} \leq I_o \leq 40\text{mA}$	25°C	-	11	40	
I_q		25°C	-	4.1	6	mA
ΔI_q	$1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	-	-	0.1	mA
	$13\text{V} \leq V_{IN} \leq 24\text{V}$		-	-	1.5	
V_N	$10\text{Hz} \leq f \leq 100\text{KHz}$	25°C	58	-	-	$\mu\text{V}/V_o$
RR	$15\text{V} \leq V_{IN} \leq 25\text{V}$, $f=120\text{Hz}$	0~125°C	-	45	-	dB
V_D		25°C	-	1.7	-	V

SM78L12 ELECTRICAL CHARACTERISTICS ($I_o=40\text{mA}$, $V_{IN}=19\text{V}$, $C_{IN}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

Symbol	Test Conditions		Min	Typ	Max	Unit
V_o		25°C	11.64	12	12.36	V
	$14\text{V} \leq V_{IN} \leq 27\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	11.4	12	12.6	
	$1\text{mA} \leq I_o \leq 70\text{mA}$		11.4	12	12.6	
ΔV_o (Line Regulation)	$14.5\text{V} \leq V_{IN} \leq 27\text{V}$	25°C	-	55	250	mV
	$16\text{V} \leq V_{IN} \leq 27\text{V}$	25°C	-	49	200	
ΔV_o (Load Regulation)	$1\text{mA} \leq I_o \leq 100\text{mA}$	25°C	-	22	100	mV
	$1\text{mA} \leq I_o \leq 40\text{mA}$	25°C	-	13	50	
I_q		25°C	-	4.3	6.5	mA
ΔI_q	$1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	-	-	0.1	mA
	$16\text{V} \leq V_{IN} \leq 27\text{V}$		-	-	1.5	
V_N	$10\text{Hz} \leq f \leq 100\text{KHz}$	25°C	-	70	-	$\mu\text{V}/V_o$
RR	$15\text{V} \leq V_{IN} \leq 25\text{V}$, $f=120\text{Hz}$	0~125°C	37	42	-	dB
V_D		25°C	-	1.7	-	V

SM78L15 ELECTRICAL CHARACTERISTICS ($I_o=40\text{mA}$, $V_{IN}=23\text{V}$, $C_{IN}=0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$ unless otherwise specified)

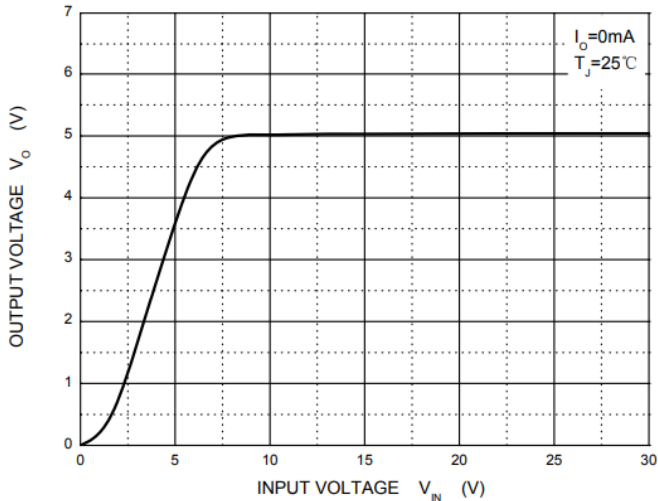
Symbol	Test Conditions		Min	Typ	Max	Unit
V_o		25°C	14.55	15	15.45	V
	$17.5\text{V} \leq V_{IN} \leq 30\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	14.25	15	15.75	
	$1\text{mA} \leq I_o \leq 70\text{mA}$		14.25	15	15.75	
ΔV_o (Line Regulation)	$17.5\text{V} \leq V_{IN} \leq 30\text{V}$	25°C	-	65	300	mV
	$19\text{V} \leq V_{IN} \leq 30\text{V}$	25°C	-	58	250	
ΔV_o (Load Regulation)	$1\text{mA} \leq I_o \leq 100\text{mA}$	25°C	-	25	150	mV
	$1\text{mA} \leq I_o \leq 40\text{mA}$	25°C	-	15	75	
I_q		25°C	-	4.6	6.5	mA
ΔI_q	$1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	-	-	0.1	mA
	$19\text{V} \leq V_{IN} \leq 30\text{V}$		-	-	1.5	
V_N	$10\text{Hz} \leq f \leq 100\text{KHz}$	25°C	-	82	-	$\mu\text{V}/V_o$
RR	$18.5\text{V} \leq V_{IN} \leq 28.5\text{V}$, $f=120\text{Hz}$	0~125°C	34	39	-	dB
V_D		25°C	-	1.7	-	V

SM78L18 ELECTRICAL CHARACTERISTICS ($I_o=40\text{mA}$, $V_{IN}=26\text{V}$, $C_{IN}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified)

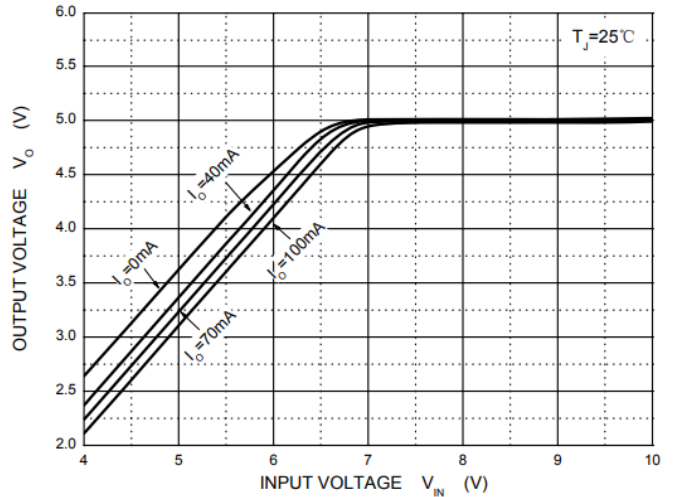
Symbol	Test Conditions		Min	Typ	Max	Unit
V_o		25°C	17.46	18	18.54	V
	$20.5\text{V} \leq V_{IN} \leq 33\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	17.1	18	18.9	
	$1\text{mA} \leq I_o \leq 70\text{mA}$		17.1	18	18.9	
ΔV_o (Line Regulation)	$20.5\text{V} \leq V_{IN} \leq 33\text{V}$	25°C	-	70	360	mV
	$22\text{V} \leq V_{IN} \leq 33\text{V}$	25°C	-	64	300	
ΔV_o (Load Regulation)	$1\text{mA} \leq I_o \leq 100\text{mA}$	25°C	-	27	180	mV
	$1\text{mA} \leq I_o \leq 40\text{mA}$	25°C	-	19	90	
I_q		25°C	-	4.7	6.5	mA
ΔI_q	$1\text{mA} \leq I_o \leq 40\text{mA}$	0~125°C	-	-	0.1	mA
	$22\text{V} \leq V_{IN} \leq 33\text{V}$		-	-	1.5	
V_N	$10\text{Hz} \leq f \leq 100\text{KHz}$	25°C	-	89	-	$\mu\text{V}/V_o$
RR	$21.5\text{V} \leq V_{IN} \leq 31.5\text{V}$, $f=120\text{Hz}$	0~125°C	32	36	-	dB
V_D		25°C	-	1.7	-	V

SM78L05 TYPICAL CHARACTERISTICS CURVE

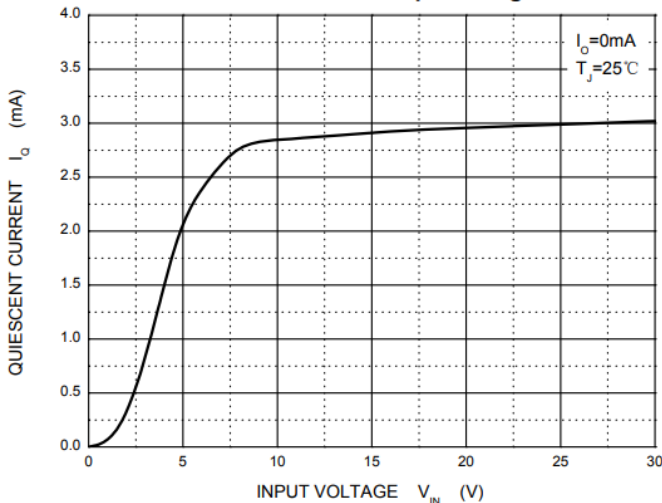
Output Characteristics



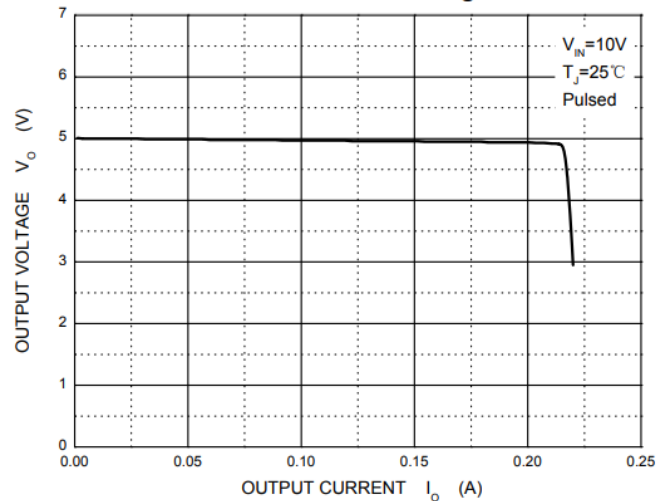
Dropout Characteristics



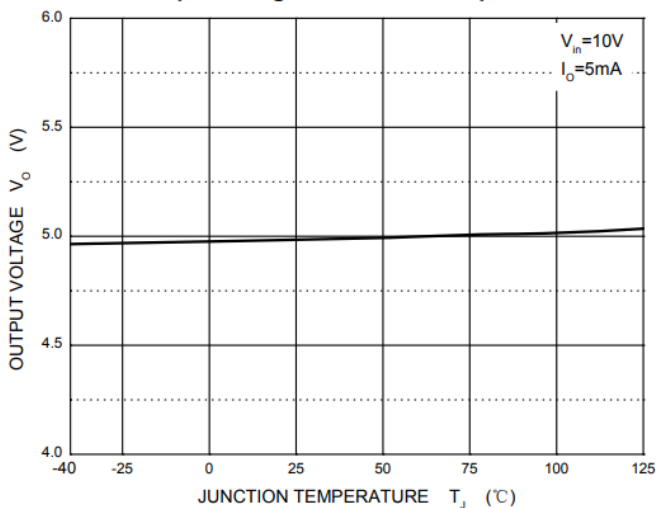
Quiescent Current vs Input Voltage



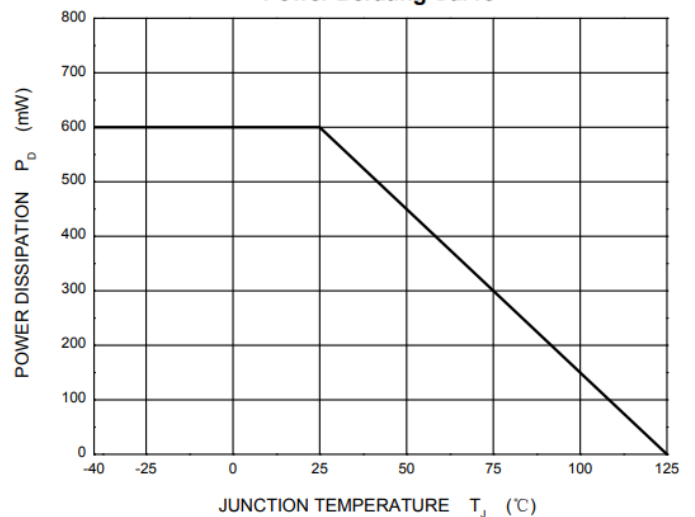
Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature

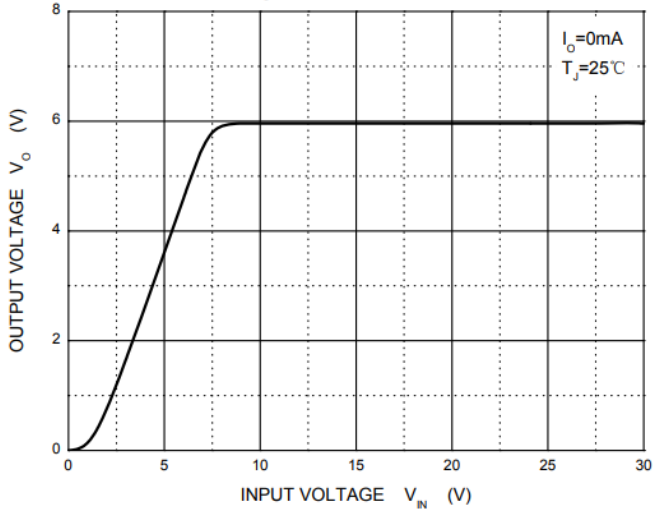


Power Derating Curve

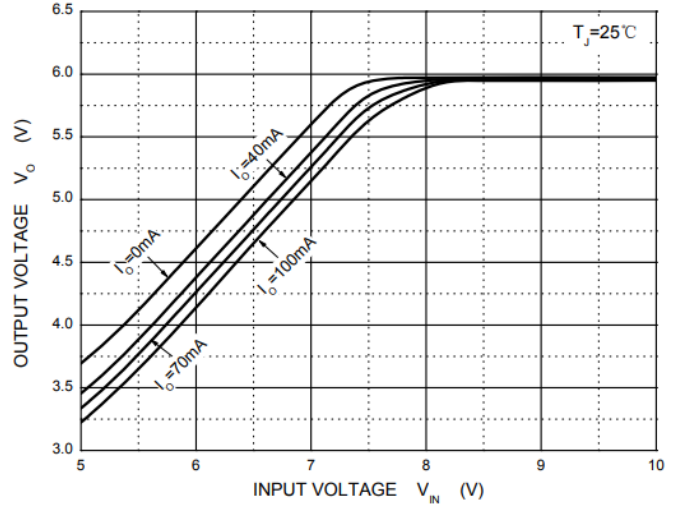


SM78L06 TYPICAL CHARACTERISTICS CURVE

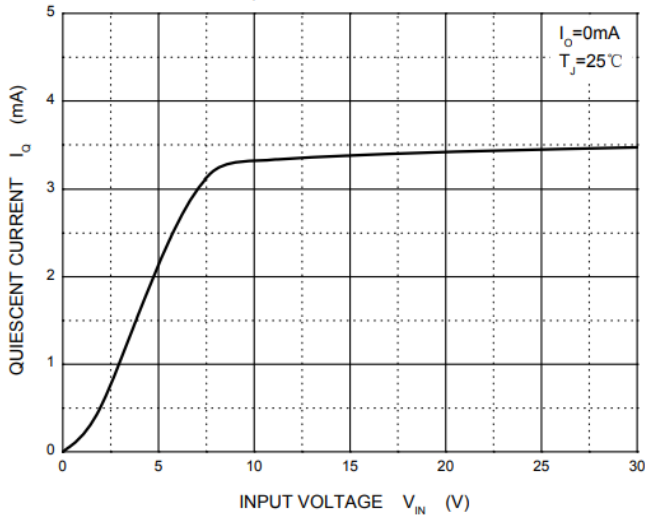
Output Characteristics



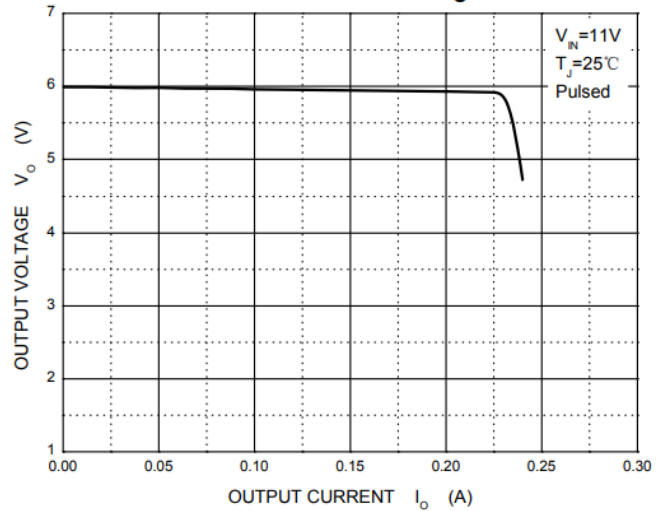
Dropout Characteristics



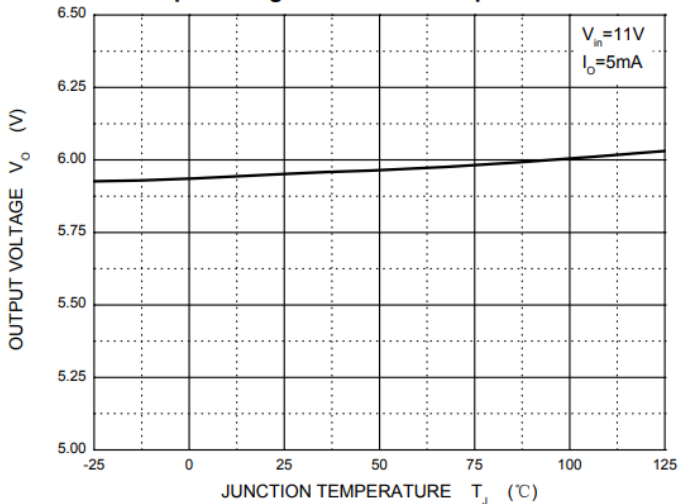
Quiescent Current



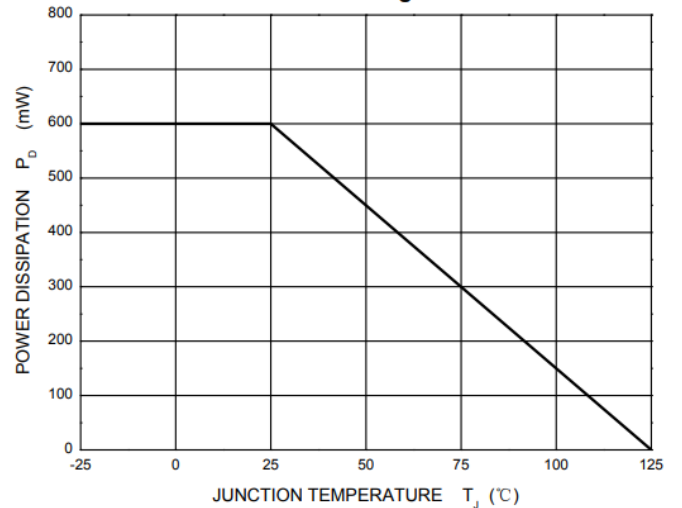
Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature

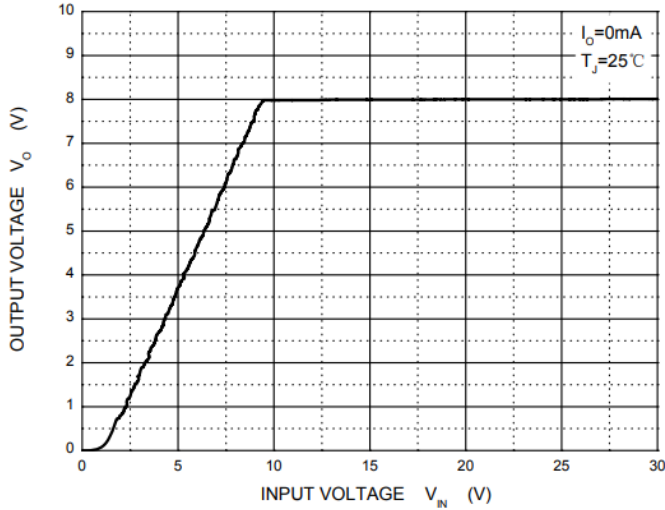


Power Derating Curve

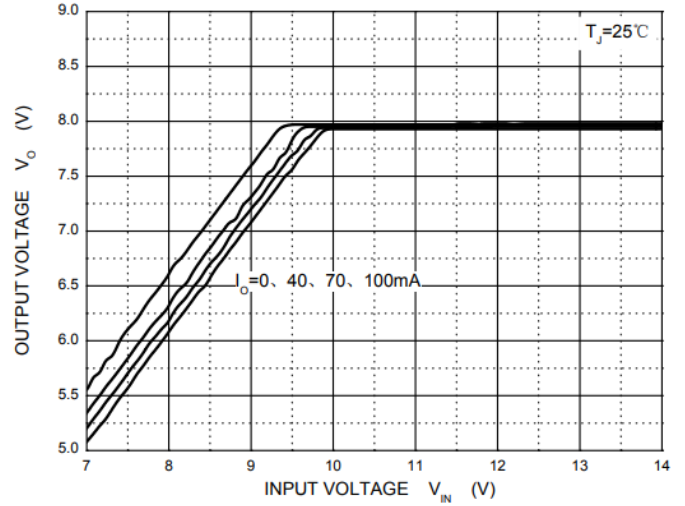


SM78L08 TYPICAL CHARACTERISTICS CURVE

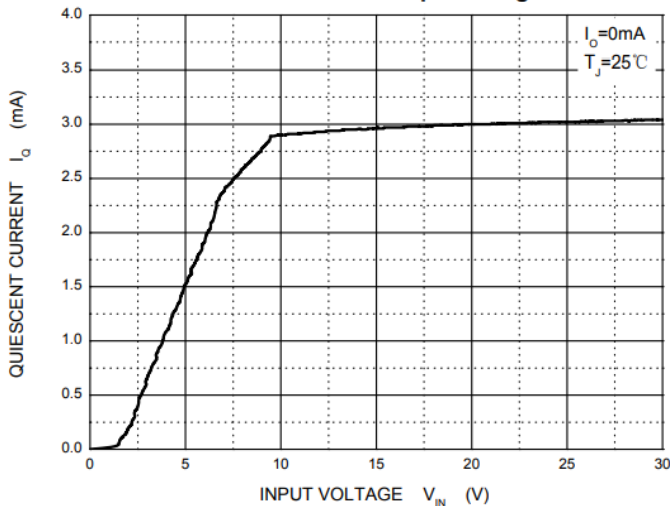
Output Characteristics



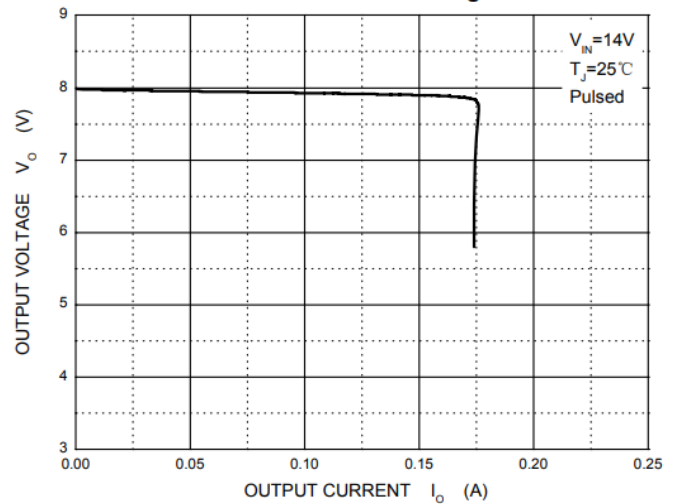
Dropout Characteristics



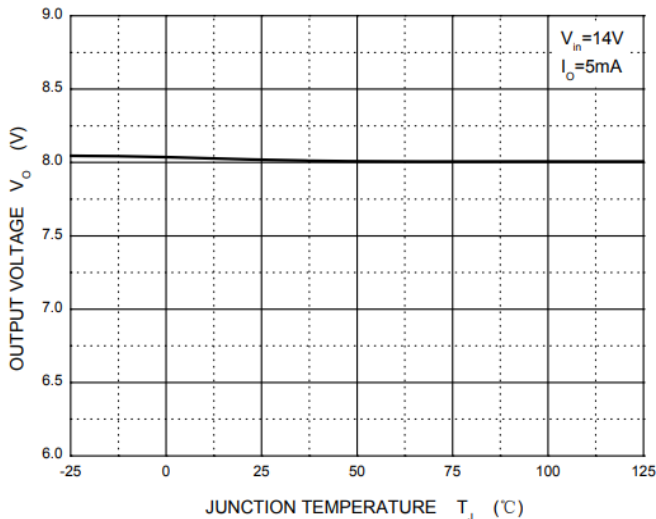
Quiescent Current vs Input Voltage



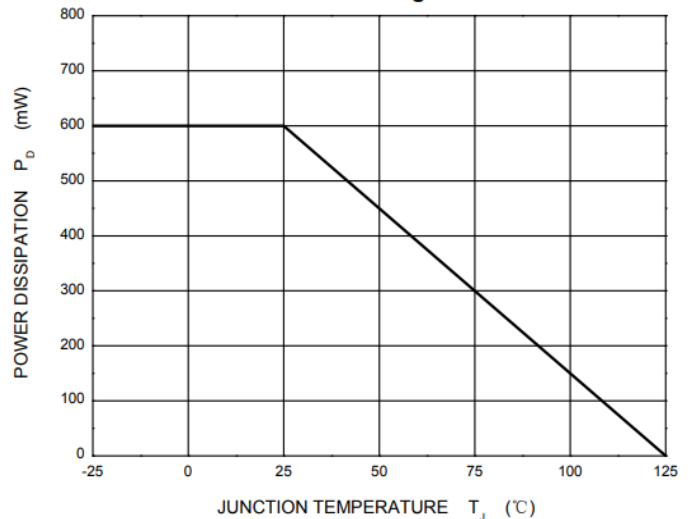
Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature

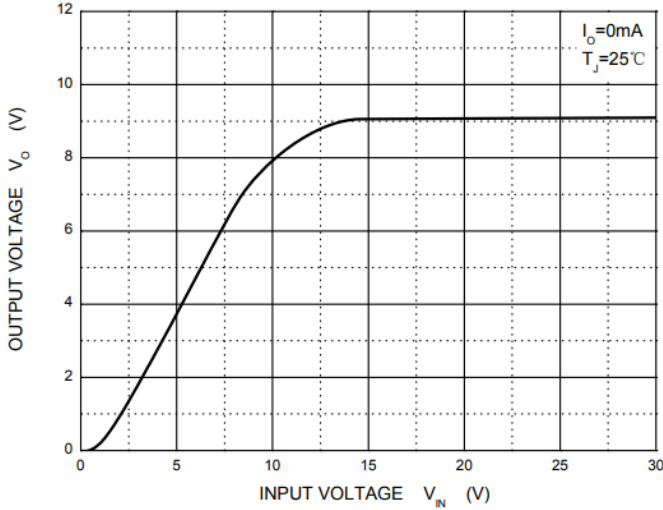


Power Derating Curve

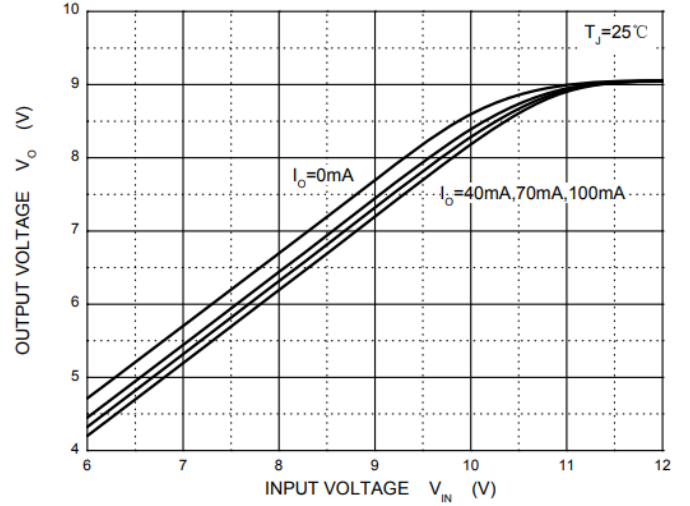


SM78L09 TYPICAL CHARACTERISTICS CURVE

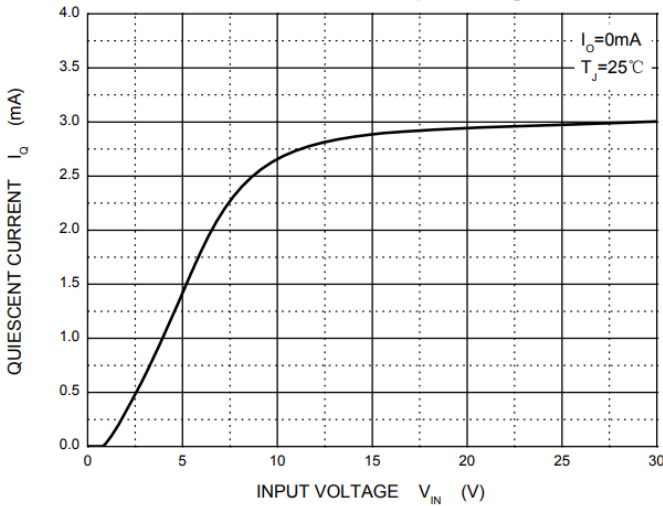
Output Characteristics



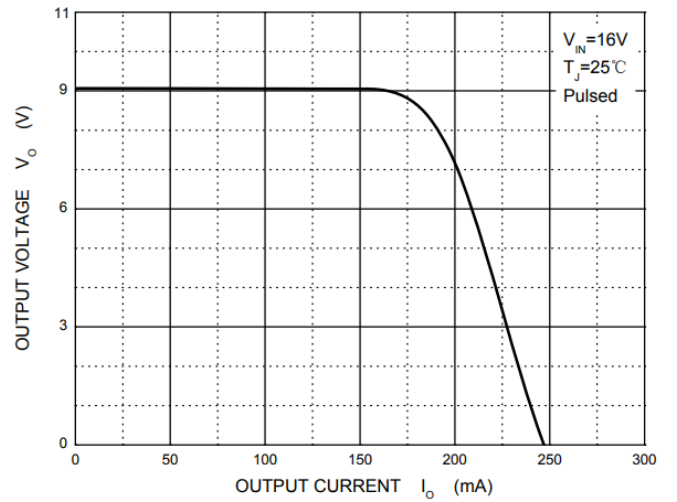
Dropout Characteristics



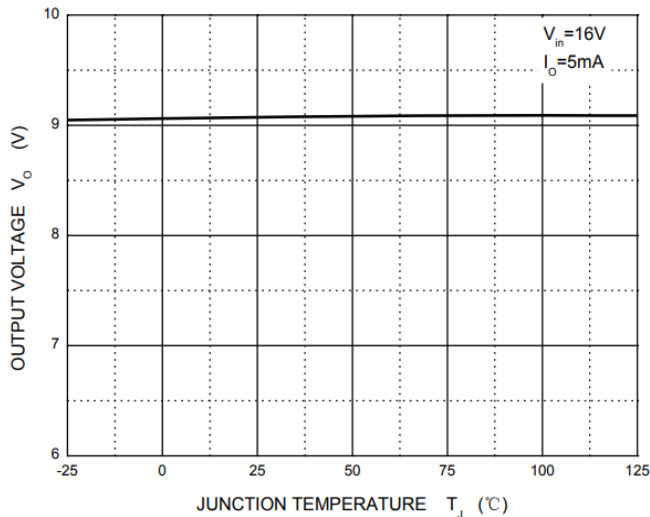
Quiescent Current vs Input Voltage



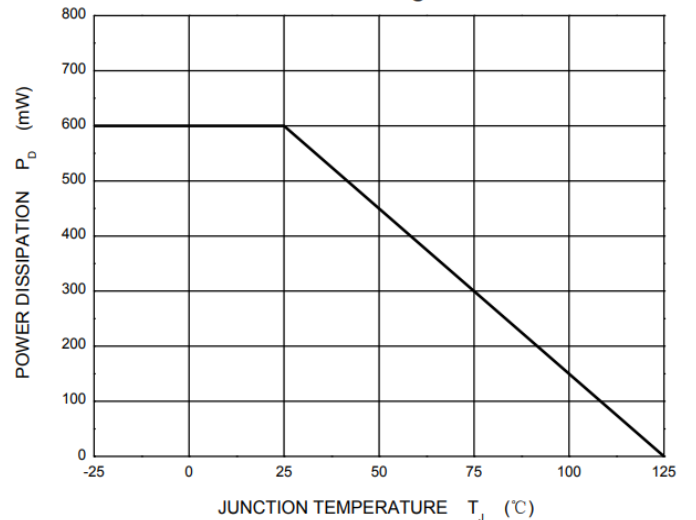
Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature

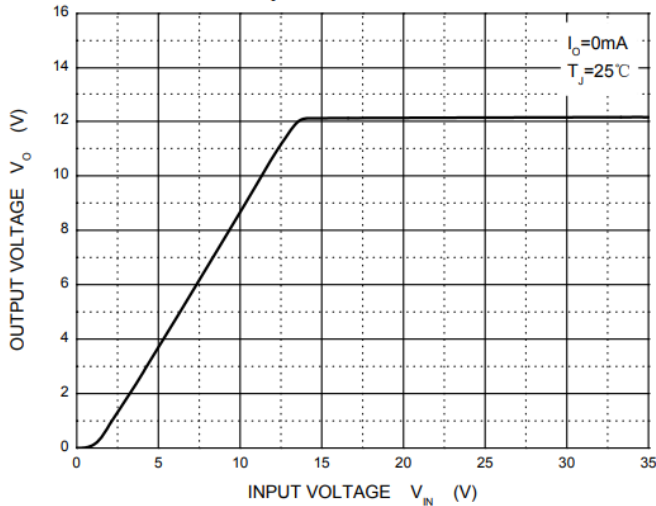


Power Derating Curve

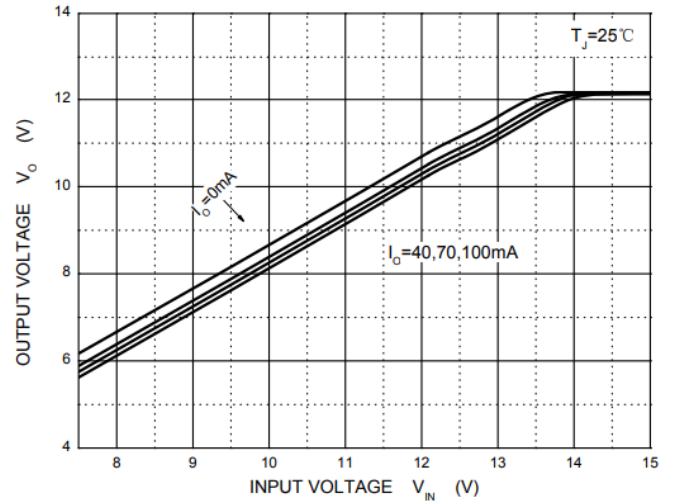


SM78L12 TYPICAL CHARACTERISTICS CURVE

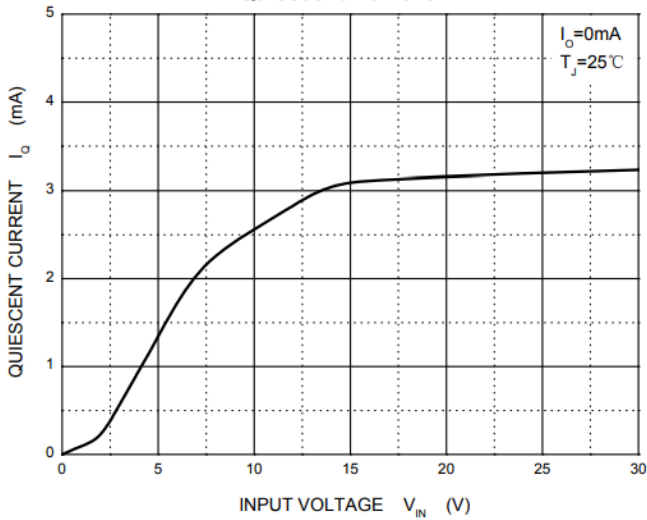
Output Characteristics



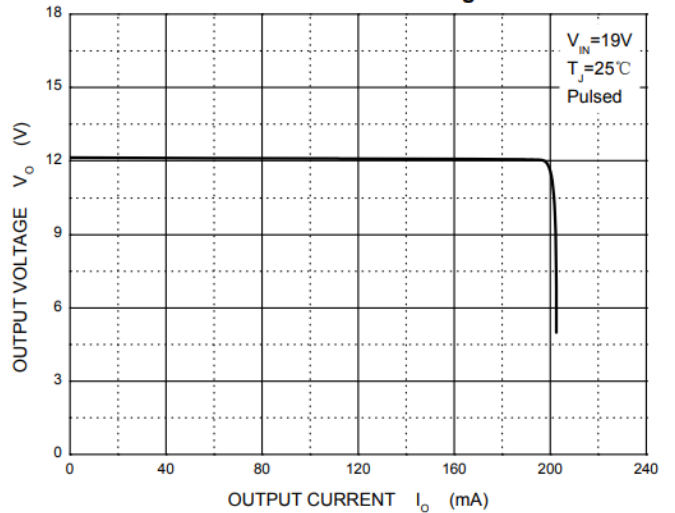
Dropout Characteristics



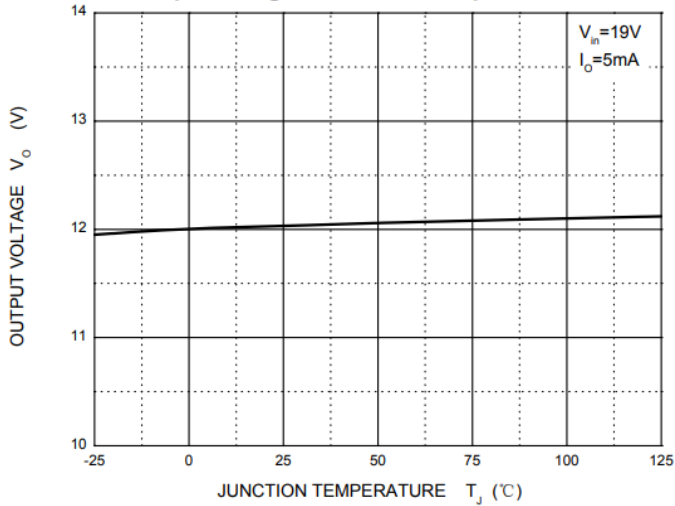
Quiescent Current



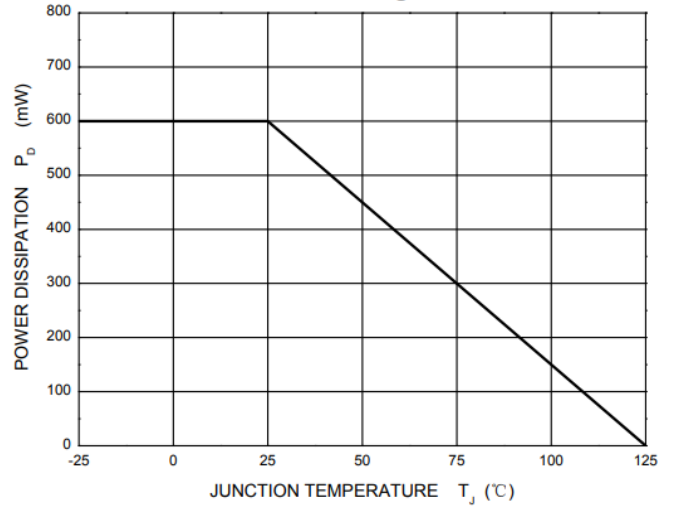
Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature

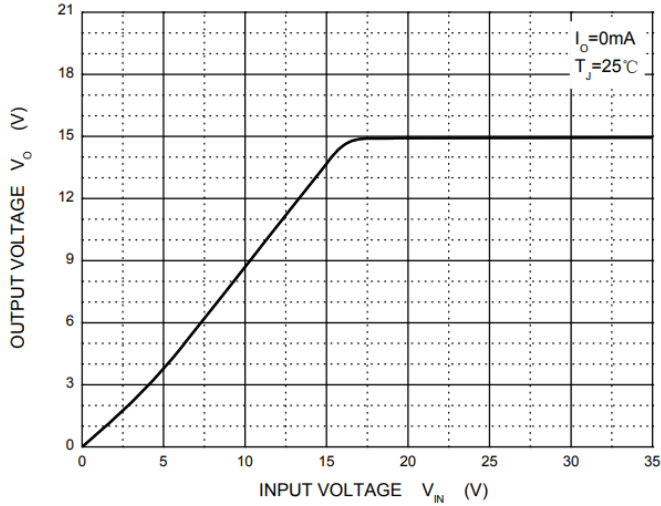


Power Derating Curve

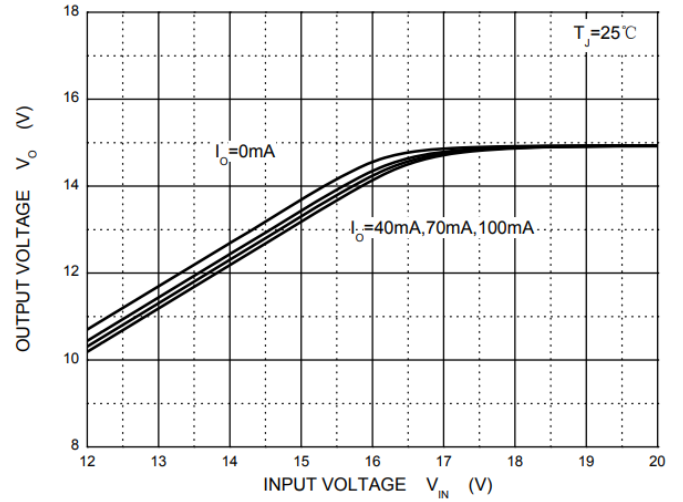


SM78L15 TYPICAL CHARACTERISTICS CURVE

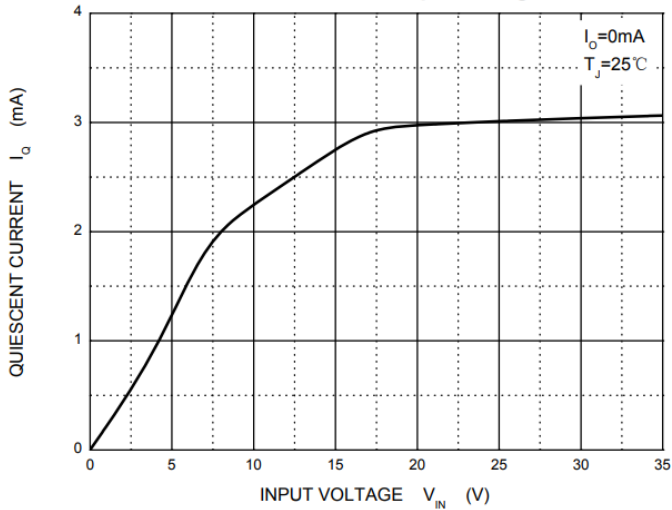
Output Characteristics



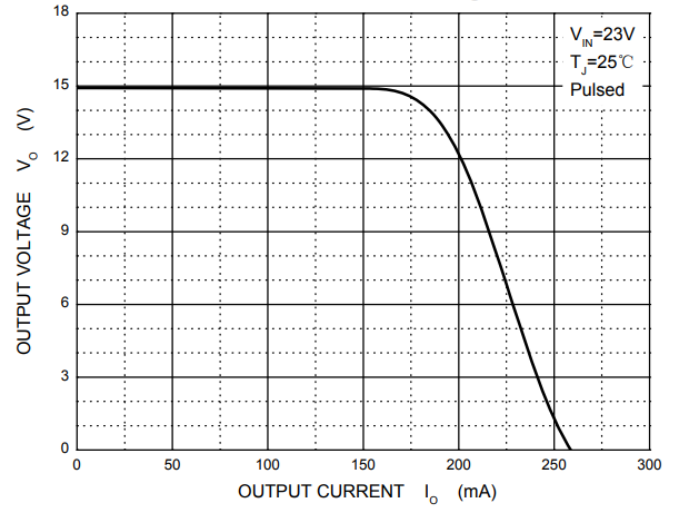
Dropout Characteristics



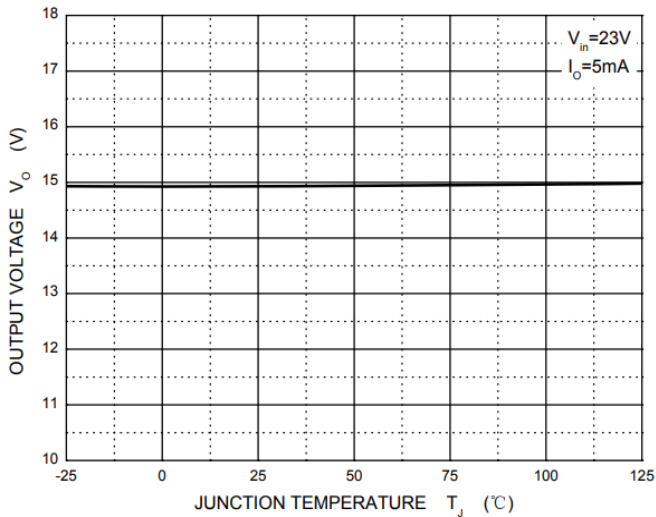
Quiescent Current vs Input Voltage



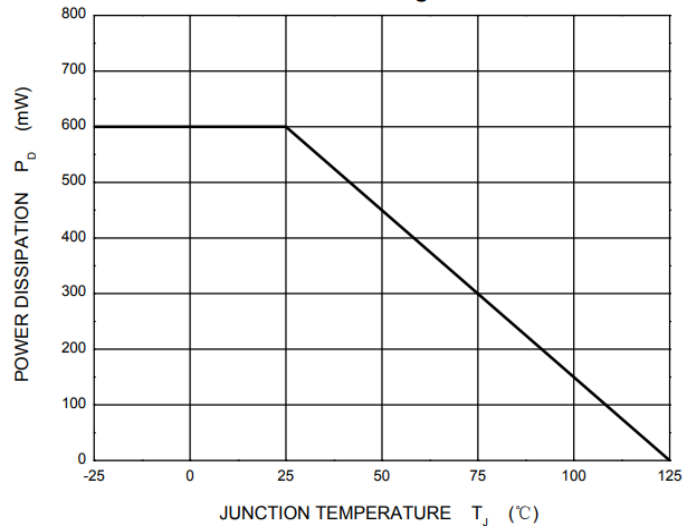
Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature

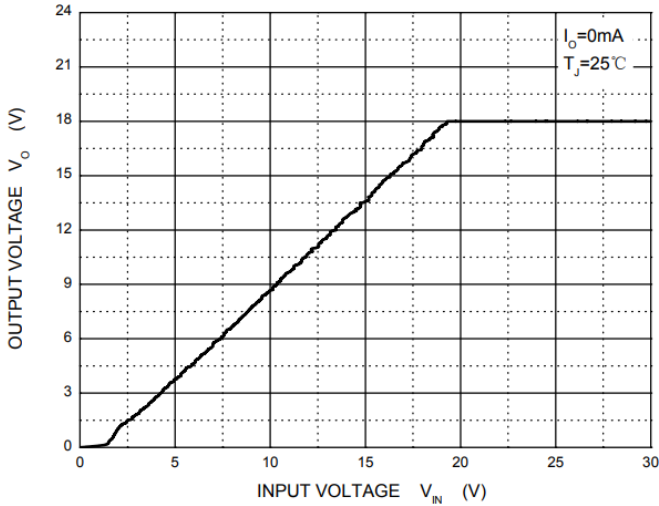


Power Derating Curve

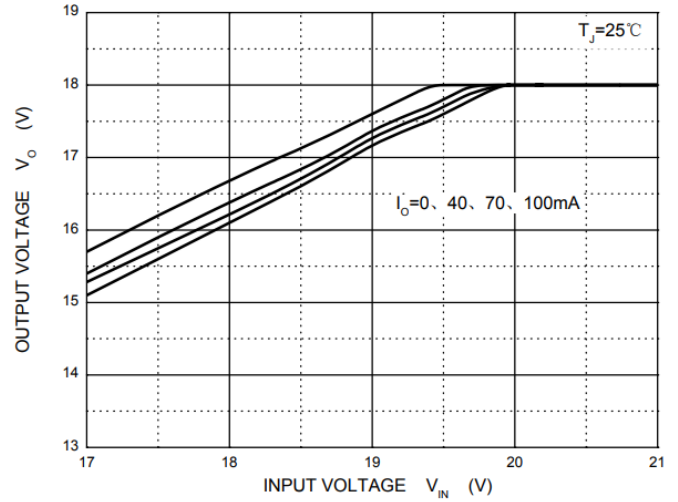


SM78L18 TYPICAL CHARACTERISTICS CURVE

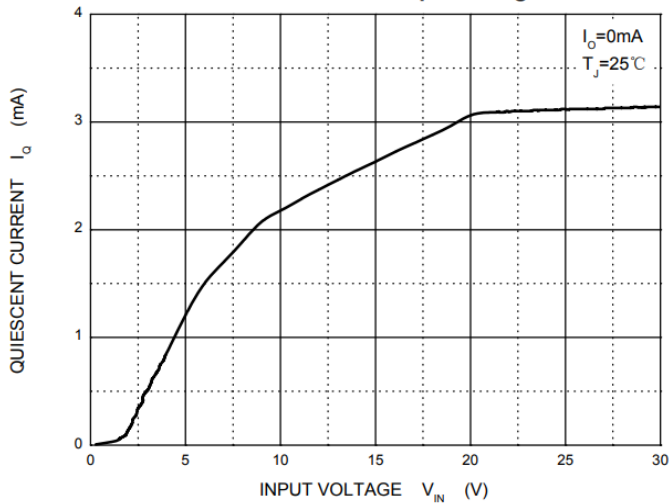
Output Characteristics



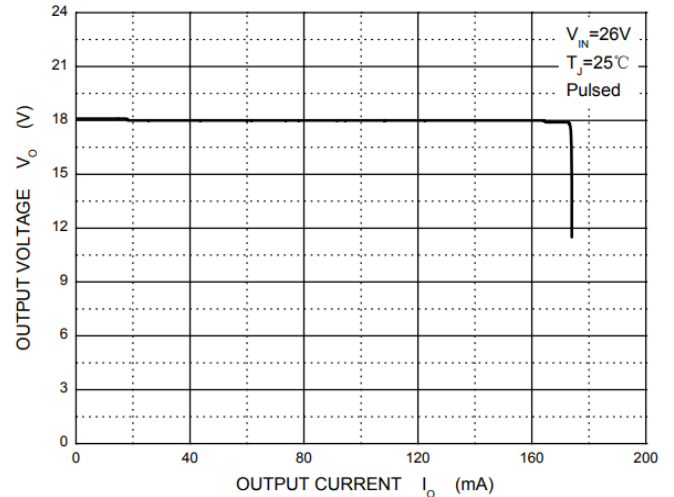
Dropout Characteristics



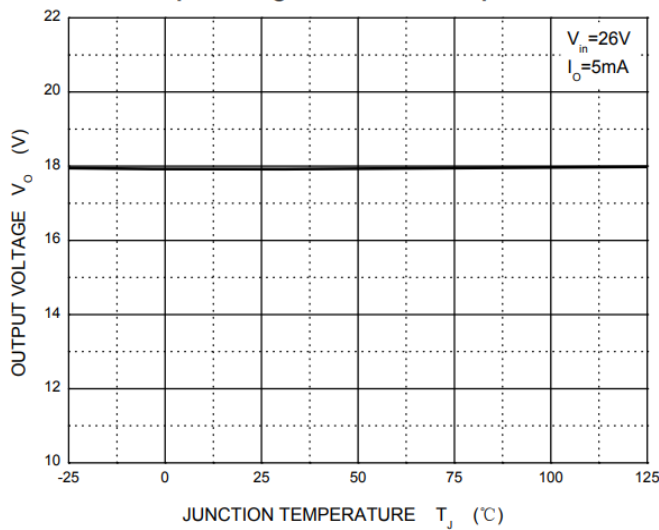
Quiescent Current vs Input Voltage



Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature



Power Derating Curve

