DC-DC CONVERTER

FEATURES

- **Miniature Package (SOT-23L-6)**
- **Few External Components**
- **Internal Rectifier and Regulator**
- **Wide Input Voltage Range (1.1 to 18 V)**
- **Selectable Output Voltages**
- **Single Battery Cell Operation**

APPLICATIONS

- **Variable Capacitance and PIN Diode Bias**
- **Portable Instrumentation**
- **Radio Control Systems**
- **Mobile Radios**
- **Cellular Telephones**
- **Cordless Telephones**
- **Fiber-Optic Receivers**
- **Local Area Network (LAN) Receivers**
- **Battery Operated Equipment**

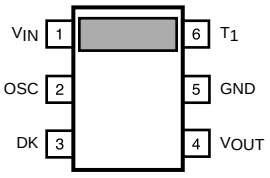
DESCRIPTION

The TK1181x series devices generate DC output voltages ranging from 7.2 to 32 V. Each device provides two regulated output voltages selectable by a single jumper. Designed for step-up operation, these devices will operate with an input voltage as low as 1.1 V, thus allowing single battery cell operation.

These converters have a built-in relaxation oscillator. The frequency of operation is determined by external component values. The built-in rectifier combined with an internal temperature compensated reference allows stable output voltages with minimal external components.

These devices are available in a miniature SOT-23L-6 surface mount package. An optimized surface mount inductor is available from TOKO (P/N: 395GN-0091IB).

TK11816 TK11817
TK11818 TK11819



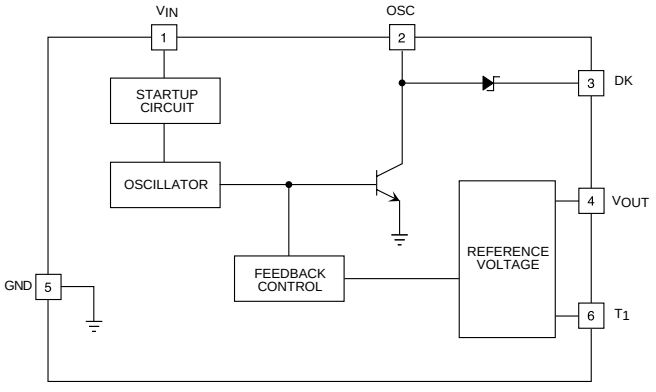
ORDERING INFORMATION

TK11816M□□
TK11817M□□
TK11818M□□
TK11819M□□

Tape/Reel Code

TAPE/REEL CODE
TL: Tape Left

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Input Voltage ..... 20 V
Power Dissipation (Note 1) ..... 200 mW
Junction Temperature ..... 150 °C
Operating Voltage Range (TK11816) ..... 1.1 to 13 V
Operating Voltage Range (TK11817) ..... 1.1 to 15 V
Operating Voltage Range (TK11818) ..... 1.1 to 18 V
Operating Voltage Range (TK11819) ..... 1.1 to 18 V
Storage Temperature Range ..... -55 to +150 °C
Operating Temperature Range ..... -20 to +70 °C
Lead Soldering Temperature (10 s) ..... 235 °C

TK11816 ELECTRICAL CHARACTERISTICS

Test Conditions: V_{IN} = 5 V, T_A = 25 °C (Notes 3 & 5), unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{IN}	Supply Current	V_{OUT} = 12.8 V, I_{OUT} = 0.1 mA		4.7	9.0	mA
		V_{OUT} = 7.2 V, I_{OUT} = 1.0 mA		12.1	19.0	mA
V_{OUT}	Output Voltage	1.1 V ≤ V_{IN} ≤ 10 V	12.1	12.8	13.5	V
		1.1 V ≤ V_{IN} ≤ 6 V	6.85	7.20	7.50	V
I_{OUT}	Output Current	V_{OUT} = 12.8 V	3.5	4.5		mA
		V_{OUT} = 7.2 V	4.0	6.0		mA
Load Reg	Load Regulation	(Note 4)		0.06	0.3	%
$\Delta V_{OUT}/\Delta T$	Temperature Coefficient	V_{OUT} = 12.8 V, I_{OUT} = 0.1 mA		1.01		mV/° C
		V_{OUT} = 7.2 V, I_{OUT} = 0.1 mA		2.02		mV/° C

TK11817 ELECTRICAL CHARACTERISTICS

Test Conditions: V_{IN} = 5 V, T_A = 25 °C (Notes 3 & 5), unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{IN}	Supply Current	V_{OUT} = 16.8 V, I_{OUT} = 0.1 mA		4.7	9.0	mA
		V_{OUT} = 9.3 V, I_{OUT} = 1.0 mA		12.1	19.0	mA
V_{OUT}	Output Voltage	1.1 V ≤ V_{IN} ≤ 15 V	16.0	16.8	17.6	V
		1.1 V ≤ V_{IN} ≤ 8 V	8.85	9.30	9.80	V
I_{OUT}	Output Current	V_{OUT} = 16.8 V	3.5	4.5		mA
		V_{OUT} = 9.3 V	4.0	6.0		mA
Load Reg	Load Regulation	(Note 4)		0.06	0.3	%
$\Delta V_{OUT}/\Delta T$	Temperature Coefficient	V_{OUT} = 16.8 V, I_{OUT} = 0.1 mA		1.81		mV/° C
		V_{OUT} = 9.3 V, I_{OUT} = 0.1 mA		2.31		mV/° C

TK11818 ELECTRICAL CHARACTERISTICS

Test Conditions: V_{IN} = 5 V, T_A = 25 °C (Notes 3 & 5), unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{IN}	Supply Current	V_{OUT} = 28 V, I_{OUT} = 0.1 mA		4.7	9.0	mA
		V_{OUT} = 20.4 V, I_{OUT} = 1.0 mA		12.1	19.0	mA
V_{OUT}	Output Voltage	1.1 V ≤ V_{IN} ≤ 18 V	26.4	28.0	29.6	V
		1.1 V ≤ V_{IN} ≤ 18 V	19.3	20.4	21.5	V
I_{OUT}	Output Current	V_{OUT} = 28 V	1.8	3.0		mA
		V_{OUT} = 20.4 V	2.5	4.0		mA
Load Reg	Load Regulation	(Note 4)		0.06	0.3	%
$\Delta V_{OUT}/\Delta T$	Temperature Coefficient	V_{OUT} = 28 V, I_{OUT} = 0.1 mA		0.2		mV/° C
		V_{OUT} = 20.4 V, I_{OUT} = 0.1 mA		0.6		mV/° C

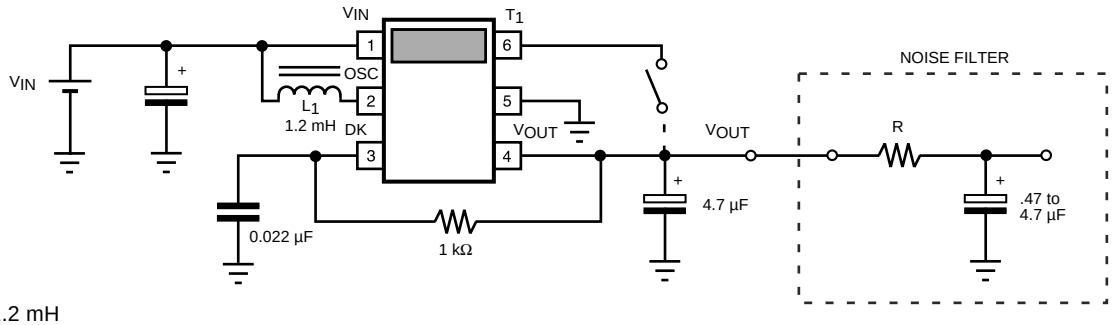
TK11819 ELECTRICAL CHARACTERISTICS

Test Conditions: V_{IN} = 5 V, T_A = 25 °C (Notes 3 & 5), unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{IN}	Supply Current	V_{OUT} = 32 V, I_{OUT} = 0.1 mA		4.7	9.0	mA
		V_{OUT} = 24 V, I_{OUT} = 1.0 mA		12.1	19.0	mA
V_{OUT}	Output Voltage	1.1 V ≤ V_{IN} ≤ 18 V	30.0	32.0	34.0	V
		1.1 V ≤ V_{IN} ≤ 18 V	22.5	24.0	25.5	V
I_{OUT}	Output Current	V_{OUT} = 32 V	1.8	3.0		mA
		V_{OUT} = 24 V	2.5	4.0		mA
Load Reg	Load Regulation	(Note 4)		0.06	0.3	%
$\Delta V_{OUT}/\Delta T$	Temperature Coefficient	V_{OUT} = 32 V, I_{OUT} = 0.1 mA		0.91		mV/° C
		V_{OUT} = 24 V, I_{OUT} = 0.1 mA		1.37		mV/° C

Note 1: Power dissipation is 400 mW when mounted. Derate at 3.2 mW/°C for operation above 25 °C. Power dissipation is 200 mW in free air. Derate at 1.6 mW/°C for operation above 25 °C.
Note 2: When operating below 25 °C, the output capacitor degradation may increase output ripple noise.
Note 3: V_{IN} = 5.0 V, No load.
Note 4: Load Regulation = (ΔV_{OUT} / V_{OUT}) x 100 %, where ΔV_{OUT} = V_{OUT} (no load) - V_{OUT} (I_{OUT} = 1.0 mA)
Note 5: Specifications are based upon a Toko 395GN-0091IB inductor. The use of other inductors may degrade performance.
Note 6: See Output Voltage Selection Table for connections to obtain desired output voltage.

TEST CIRCUIT



Note:
L_1 = 1.2 mH
Toko Part Number: 395GN-0091IB

The noise filter is not built in.
Please use an external circuit if desired.
$I_{LOAD} = I_{OUT}$
Design within R x I_{OUT} = 50 to 150 mV

OUTPUT VOLTAGE SELECTION

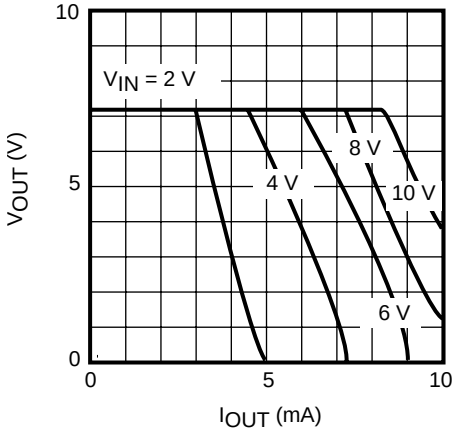
PART NUMBER	MARKING	OUTPUT VOLTAGE	
		V_{OUT} - T_1 (OPEN)	V_{OUT} - T_1 (JUMPERED)
TK11816	D6	12.8 V	7.2 V
TK11817	D7	16.8 V	9.3 V
TK11818	D8	28.0 V	20.4 V
TK11819	D9	32.0 V	24.0 V

TYPICAL PERFORMANCE CHARACTERISTICS

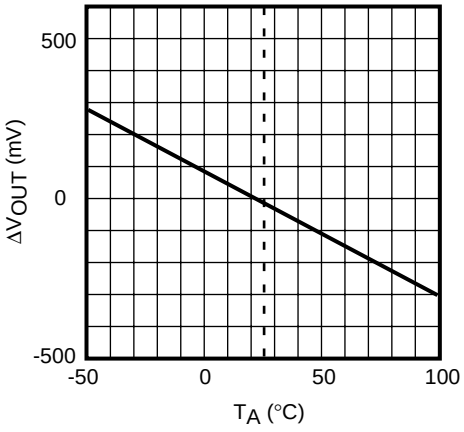
T_A = 25 °C, unless otherwise specified.

TK11816 (V_{OUT} - T_1 JUMPERED)

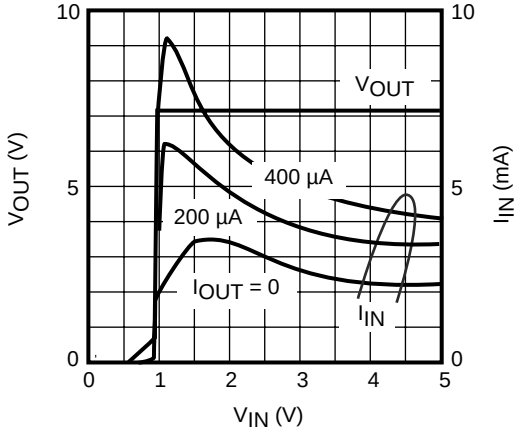
OUTPUT VOLTAGE vs. OUTPUT CURRENT



OUTPUT VOLTAGE CHANGE vs. TEMPERATURE

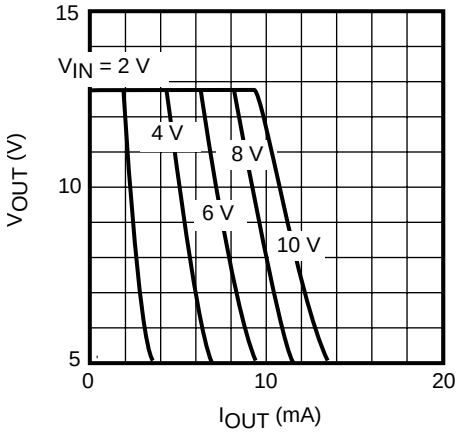


OUTPUT VOLTAGE AND SUPPLY CURRENT vs. INPUT VOLTAGE

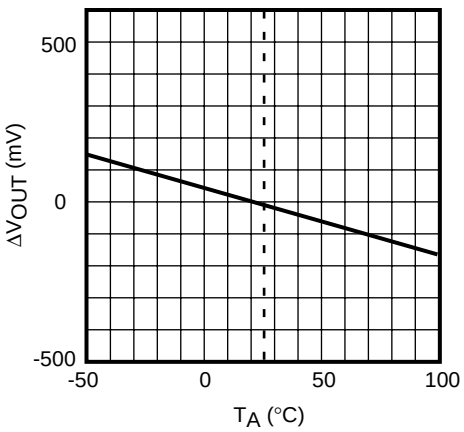


TK11816 (V_{OUT} - T_1 OPEN)

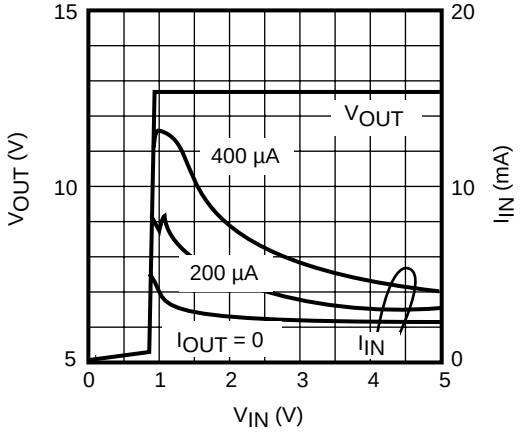
OUTPUT VOLTAGE vs. OUTPUT CURRENT



OUTPUT VOLTAGE CHANGE vs. TEMPERATURE

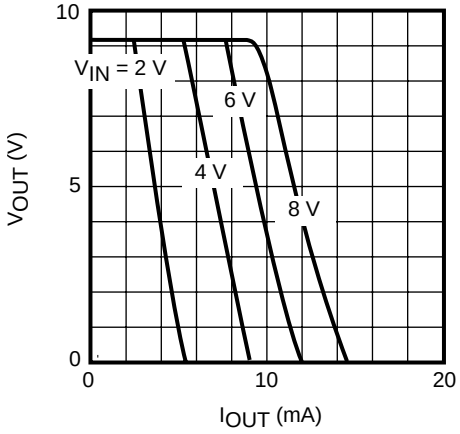


OUTPUT VOLTAGE AND SUPPLY CURRENT vs. INPUT VOLTAGE

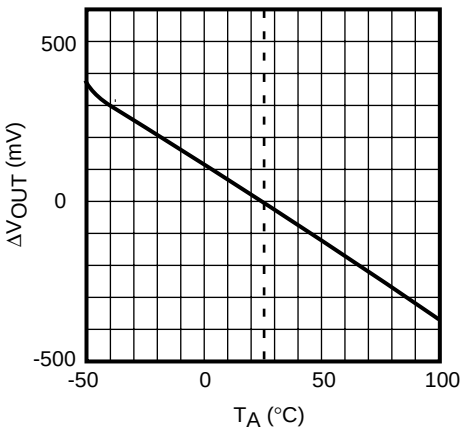


TK11817 (V_{OUT} - T_1 JUMPERED)

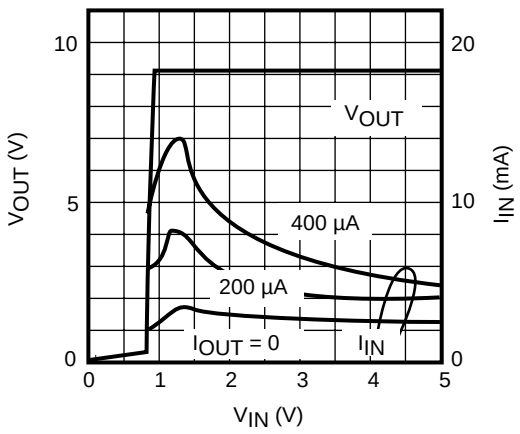
OUTPUT VOLTAGE vs. OUTPUT CURRENT



OUTPUT VOLTAGE CHANGE vs. TEMPERATURE



OUTPUT VOLTAGE AND SUPPLY CURRENT vs. INPUT VOLTAGE

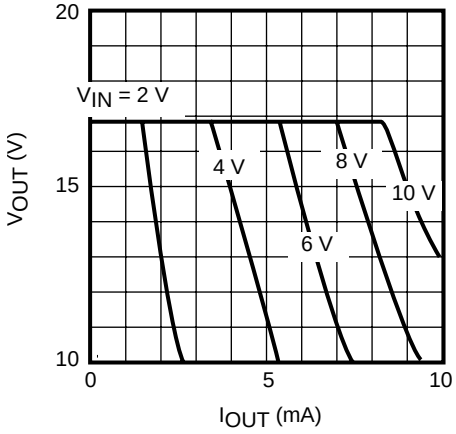


TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

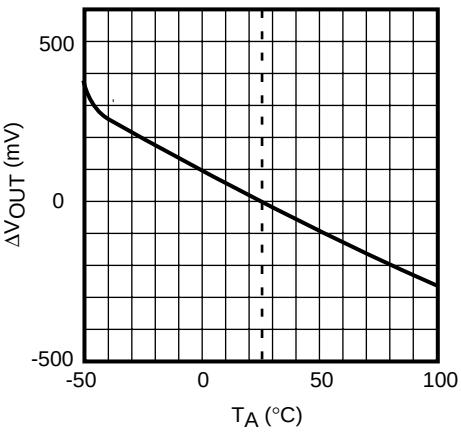
T_A = 25 °C, unless otherwise specified.

TK11817 (V_{OUT} - T_1 OPEN)

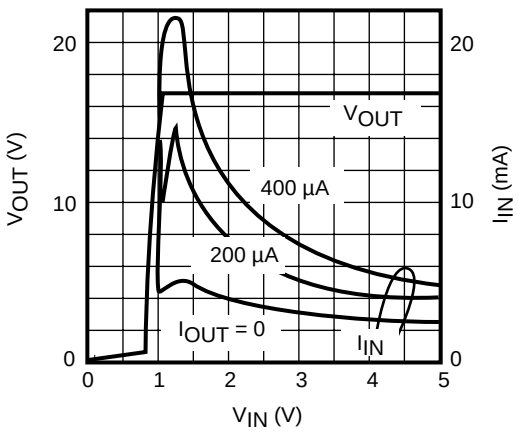
OUTPUT VOLTAGE vs. OUTPUT CURRENT



OUTPUT VOLTAGE CHANGE vs. TEMPERATURE

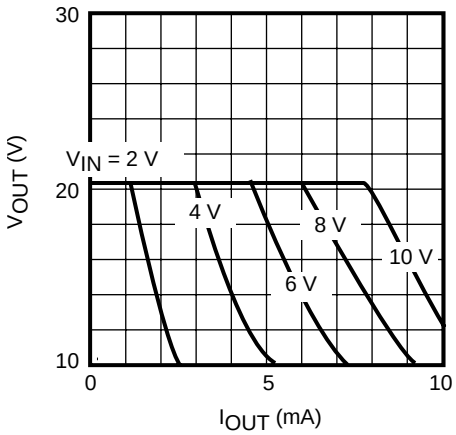


OUTPUT VOLTAGE AND SUPPLY CURRENT vs. INPUT VOLTAGE

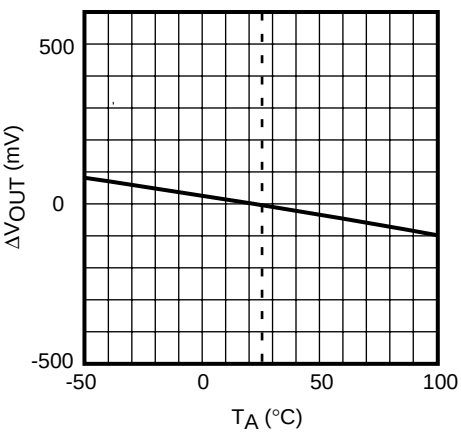


TK11818 (V_{OUT} - T_1 JUMPERED)

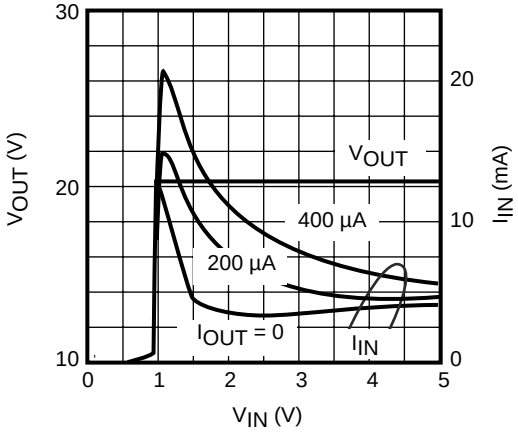
OUTPUT VOLTAGE vs. OUTPUT CURRENT



OUTPUT VOLTAGE CHANGE vs. TEMPERATURE

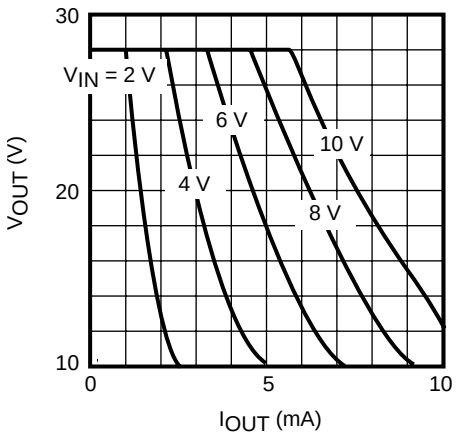


OUTPUT VOLTAGE AND SUPPLY CURRENT vs. INPUT VOLTAGE

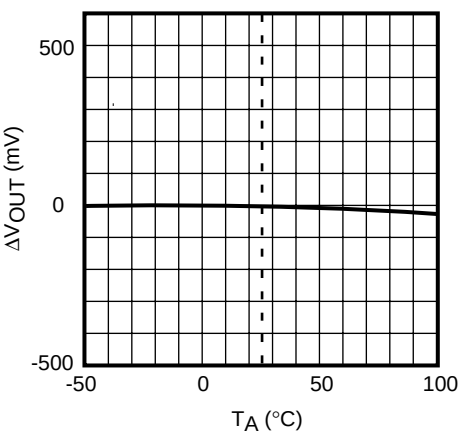


TK11818 (V_{OUT} - T_1 OPEN)

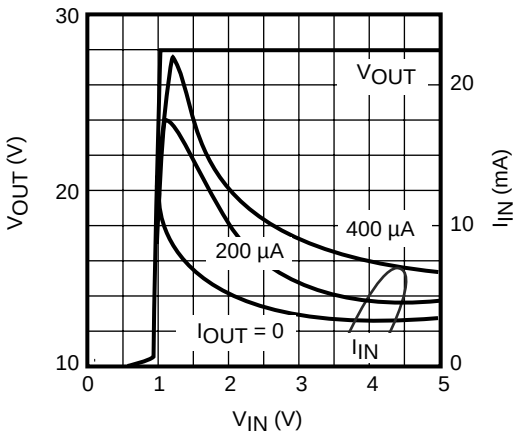
OUTPUT VOLTAGE vs. OUTPUT CURRENT



OUTPUT VOLTAGE CHANGE vs. TEMPERATURE



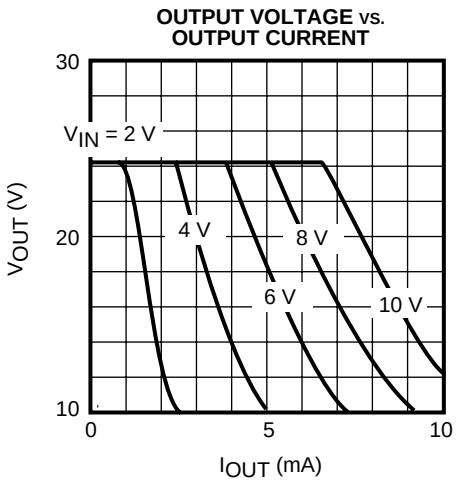
OUTPUT VOLTAGE AND SUPPLY CURRENT vs. INPUT VOLTAGE

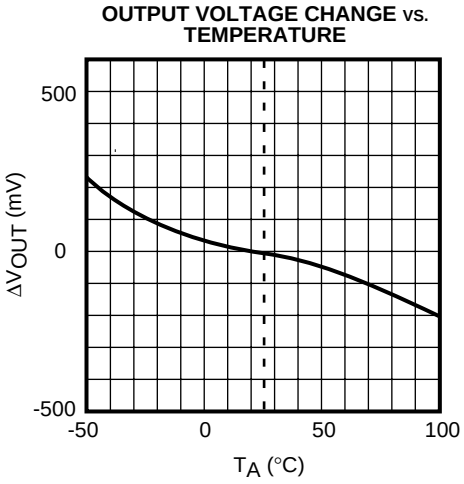


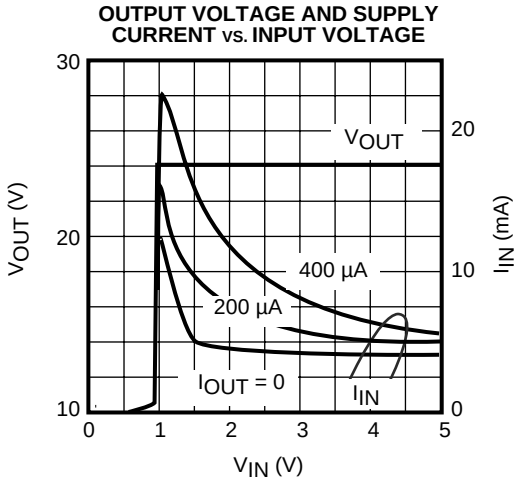
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

T_A = 25 °C, unless otherwise specified.

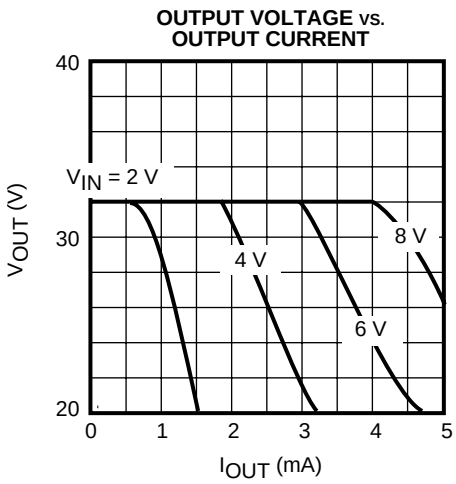
TK11819 (V_{OUT} - T_1 JUMPERED)

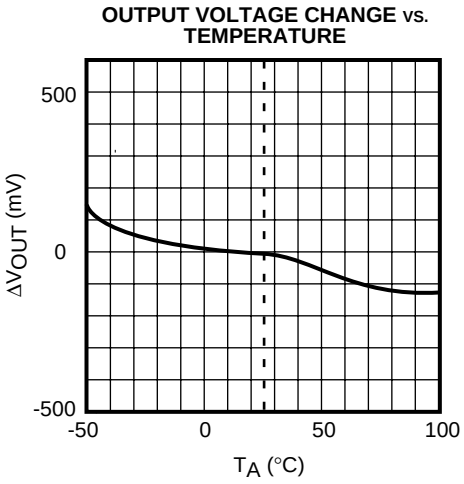


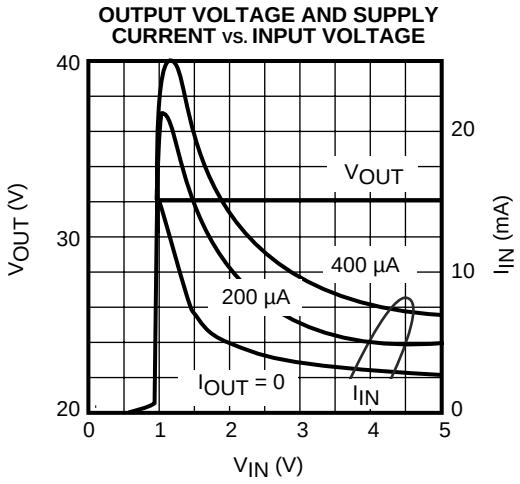




TK11819 (V_{OUT} - T_1 OPEN)







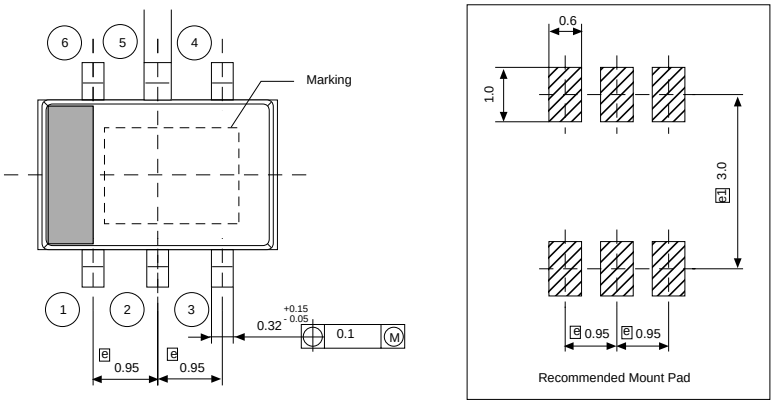
APPLICATION INFORMATION

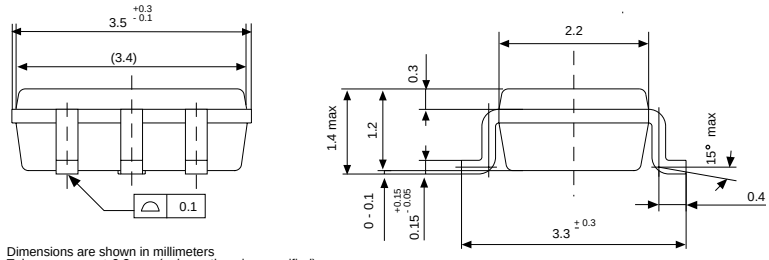
HANDLING MOLDED RESIN PACKAGES

All plastic molded packages absorb some moisture from the air. If moisture absorption occurs prior to soldering the device onto the printed circuit board, increased separation of the lead from the plastic molding may occur, degrading the moisture barrier characteristics of the device. This property of plastic molding compounds should not be overlooked, particularly in the case of very small packages, where the plastic is very thin. In order to preserve the original moisture barrier properties of the package, devices are stored and shipped in moisture proof bags, filled with dry air. The bags should not be opened or damaged prior to the actual use of the devices. If this is unavoidable, the devices should be stored in a low relative humidity environment (40 to 65%) or in an enclosed environment with desiccant.

PACKAGE OUTLINE

SOT-23L (SOT-23L-6)





Dimensions are shown in millimeters
Tolerance: x.x = ± 0.2 mm (unless otherwise specified)

Marking Information

	Marking
TK11816	D6
TK11817	D7
TK11818	D8
TK11819	D9

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