

PRELIMINARY SPECIFICATION THREE TERMINAL VOLTAGE REGULATOR

FEATURES

- Low Dropout Voltage
- Very Low Standby Current (No Load)
- Good Load Regulation
- Internal Thermal Shutdown
- Short Circuit Protection
- 3% Output Voltage Accuracy
- Available On Paper Tape
- Customized Versions Are Available

APPLICATIONS

- Battery Powered Systems
- Portable Consumer Equipment
- Cordless Telephones
- Personal Communications Equipment
- Portable Instrumentation
- Radio Control Systems
- Toys
- Low Voltage Systems

DESCRIPTION

The TK116xxU series devices are low power, linear 3-terminal regulators.

An internal PNP pass-transistor is used in order to achieve low dropout voltage (typically 160mV at 80 mA load current).

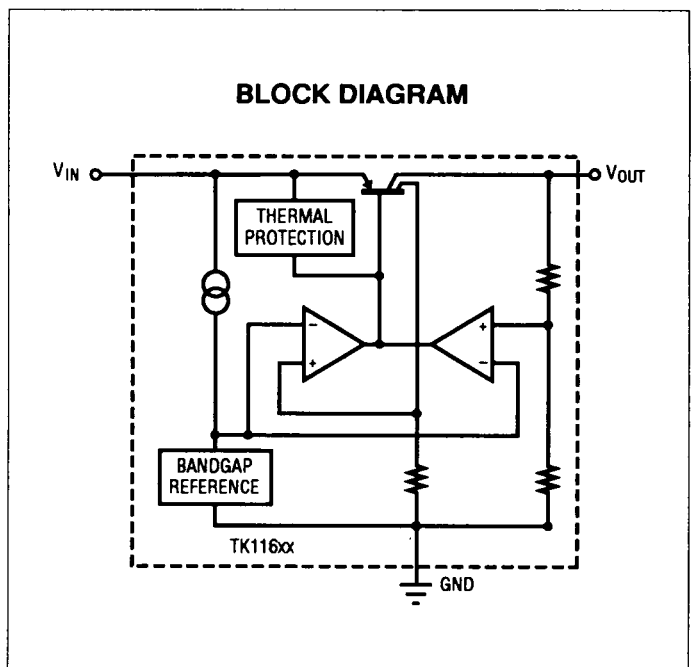
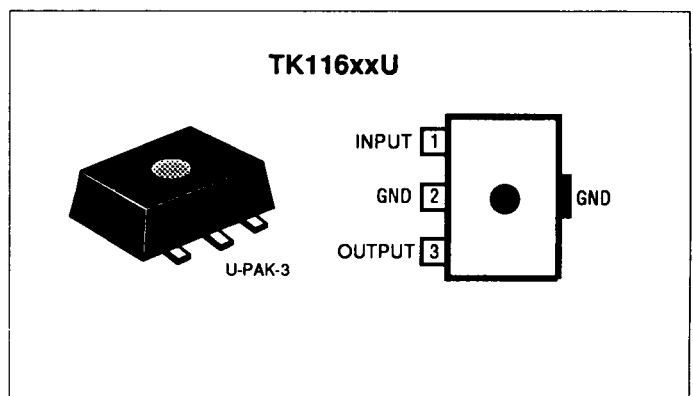
The regulated output voltage may be specified in 0.5 V increments between 2.0 to 5.5 V. Separate data sheets are available for the various options. The device has very low (400 μ A) quiescent current with no load and 2 mA with 60 mA load.

An internal thermal shutdown circuit limits the junction temperature to below 150 $^{\circ}$ C. The load current is internally monitored and the device will shut down in the presence of a short circuit at the output.

The TK116xxU series is available in bulk and plastic tape and reel U-PAK-3 packages.

PURCHASING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
3-Lead U-PAK-3 Plastic	-30 to 80 $^{\circ}$ C	TK116xxU
3-Lead U-PAK-3 Tape	-30 to 80 $^{\circ}$ C	TK116xxUT



TK116xxU

ABSOLUTE MAXIMUM RATINGS

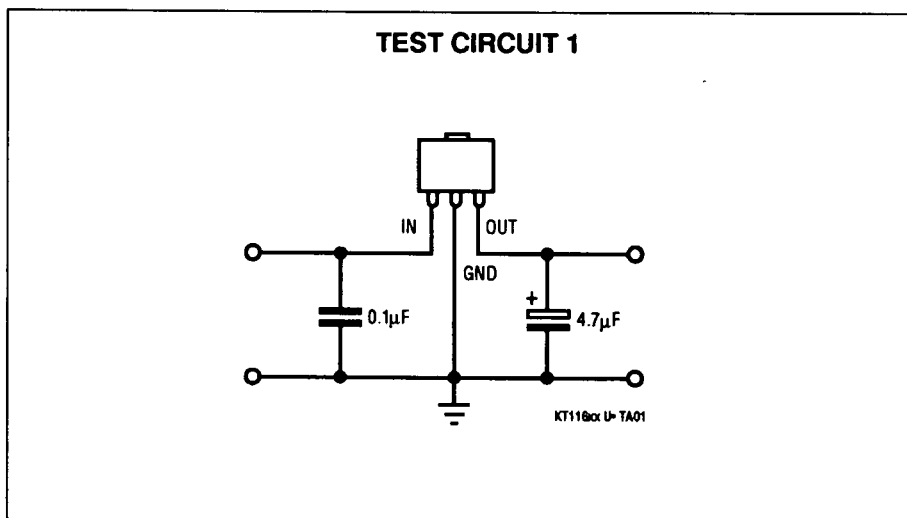
Supply Voltage.....	18 V	Storage Temperature Range.....	-55 to +150 °C
Output Voltage.....	$V_{OUT} \times 1.15$ V	Operating Temperature Range.....	-30 to +80 °C
Load Current.....	250 mA	Lead Soldering Temp. (10sec.).....	240 °C
Power Dissipation (Note 1).....	600 mW	Junction Temperature.....	150 °C

ELECTRICAL CHARACTERISTICS $T_A=25$ °C, Note 2

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Supply Voltage Range		2.5		16	V
I_{IN1}	Supply Current	$I_{OUT}=0$ mA		400		μ A
I_{IN2}	Supply Current	$V_{IN} < V_{OUT}$		800		μ A
V_{OUT}	Regulated Output Voltage	$V_{IN}=V_{OUT}+1$ V, $I_{OUT}=10$ mA	-3	V_{OUT}	+3	%
V_{DROP1}	Dropout Voltage	$I_{OUT}=0$ mA		50	100	mV
V_{DROP2}	Dropout Voltage	$I_{OUT}=60$ mA		130	200	mV
I_{OUT}	Output Current		190	150		mA
LI_{REG}	Line Regulation	$(V_{OUT}+1.0$ V) $\leq V_{IN} \leq (V_{OUT}+6$ V)		5		%/V
LD_{REG1}	Load Regulation	0 mA $\leq I_{OUT} \leq 30$ mA, $V_{IN}=V_{OUT}+1.0$ V		10		%/mA
LD_{REG2}	Load Regulation	0 mA $\leq I_{OUT} \leq 60$ mA, $V_{IN}=V_{OUT}+1.0$ V		15		%/mA
V_{RIPPLE}	Ripple Rejection	100 mV _{RMS} , $f=400$ Hz $V_{IN}=V_{OUT}+1.5$ V, $I_{OUT}=10$ mA		63		dB
$\Delta V_{OUT}/\Delta T_A$	Output Voltage Temperature Coefficient	0 °C $\leq T_A \leq 75$ °C, $V_{IN}=V_{OUT}+1.5$ V, $I_{OUT}=10$ mA		± 0.25		mV/°C
V_N	Output Noise Voltage	$V_{IN}=V_{OUT}+1.5$ V, $I_{OUT}=10$ mA 10 Hz $< f < 100$ kHz, $I_{OUT}=10$ mA		150		μ V _{RMS}

Note 1: Maximize size of solder pad under center pins.

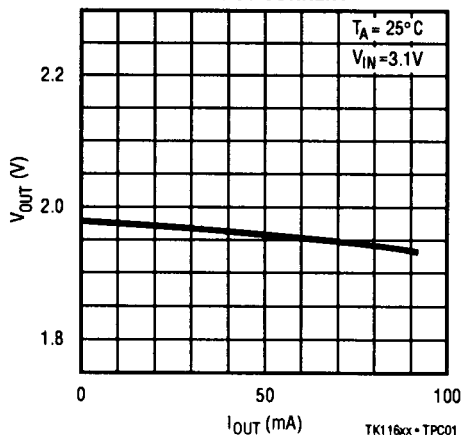
Note 2: Due to the common format used here, some specifications may not apply to all versions of output voltage. Detailed specifications are available for each version.



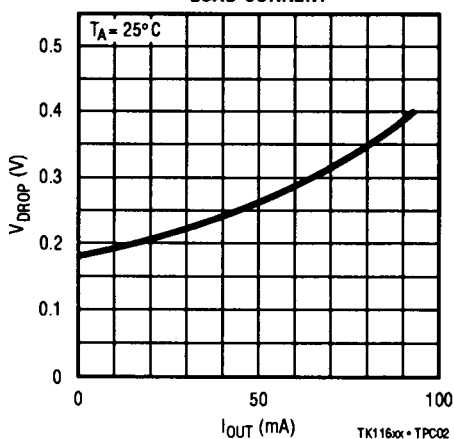
TYPICAL PERFORMANCE CHARACTERISTICS

TK11620

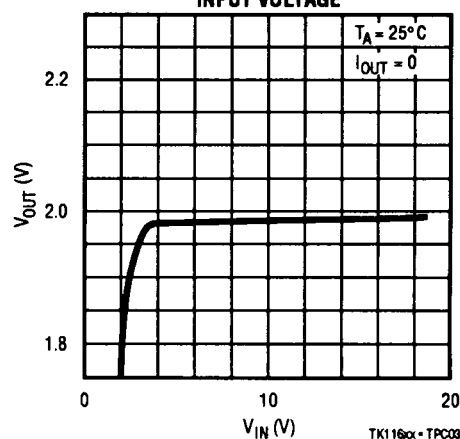
OUTPUT VOLTAGE vs OUTPUT CURRENT



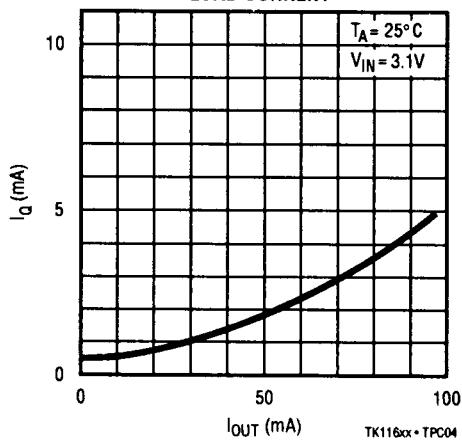
DROPOUT VOLTAGE vs LOAD CURRENT



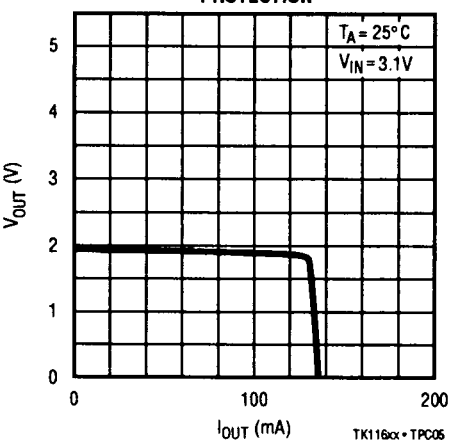
OUTPUT VOLTAGE vs INPUT VOLTAGE



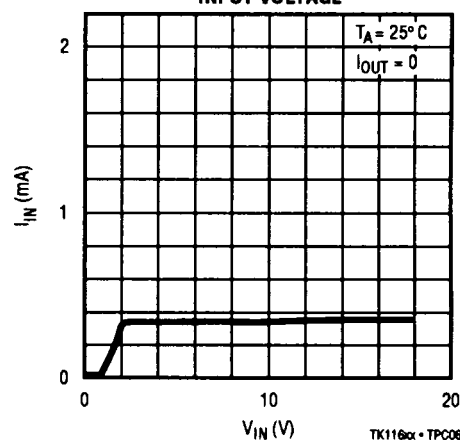
QUIESCENT CURRENT vs LOAD CURRENT



SHORT CIRCUIT PROTECTION

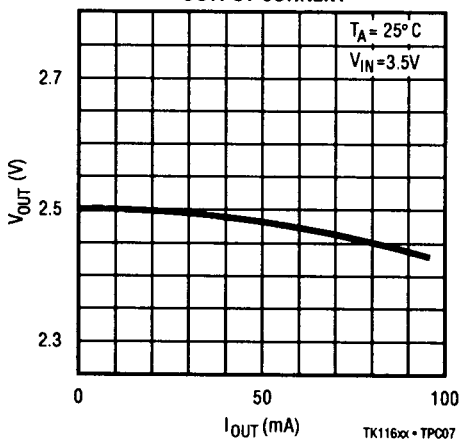


INPUT CURRENT vs INPUT VOLTAGE

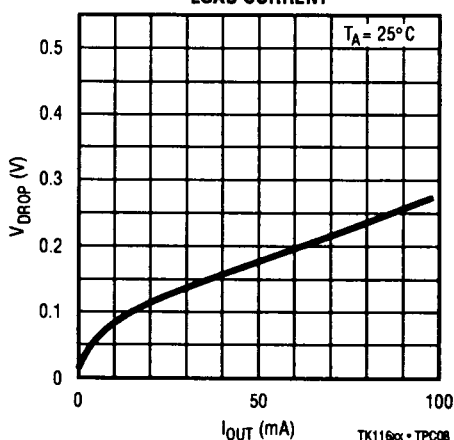


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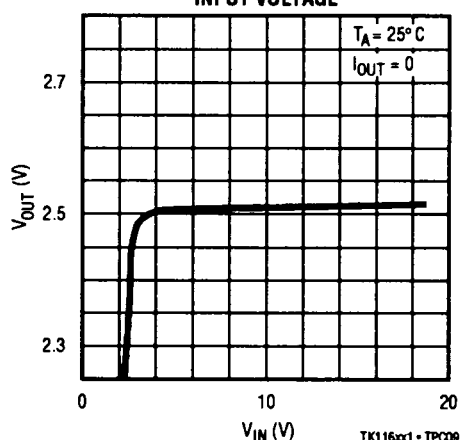
OUTPUT VOLTAGE vs OUTPUT CURRENT



DROPOUT VOLTAGE vs LOAD CURRENT



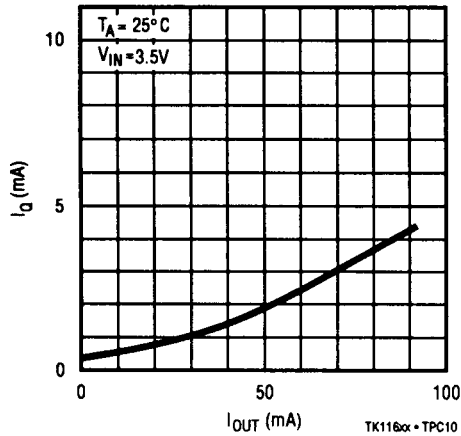
OUTPUT VOLTAGE vs INPUT VOLTAGE



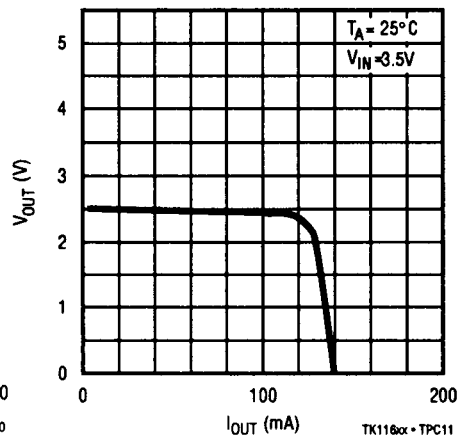
TYPICAL PERFORMANCE CHARACTERISTICS

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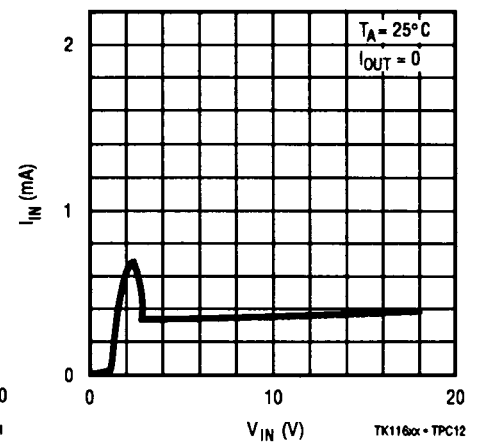
QUIESCENT CURRENT vs LOAD CURRENT



SHORT CIRCUIT PROTECTION

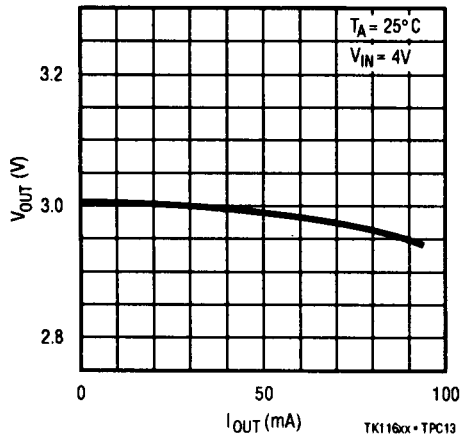


INPUT CURRENT vs INPUT VOLTAGE

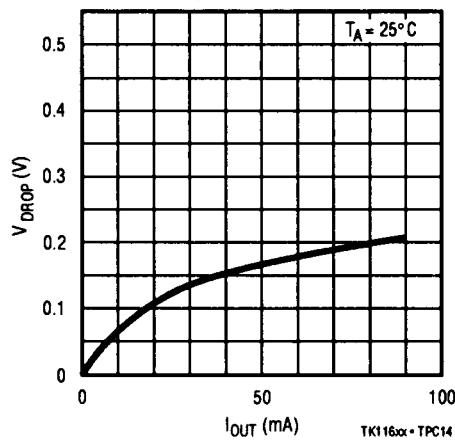


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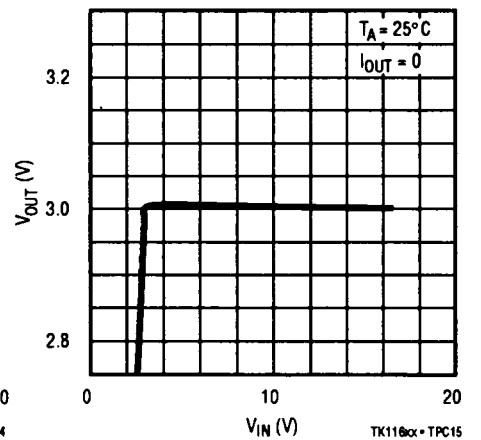
OUTPUT VOLTAGE vs OUTPUT CURRENT



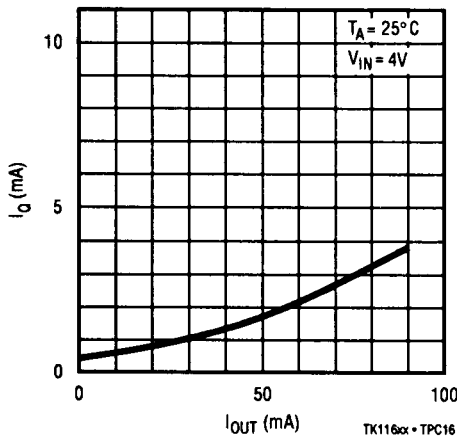
DROPOUT VOLTAGE vs LOAD CURRENT



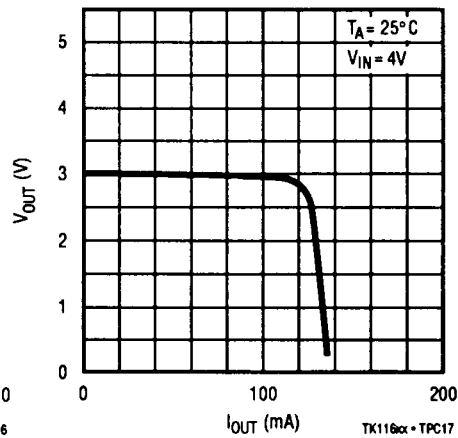
OUTPUT VOLTAGE vs INPUT VOLTAGE



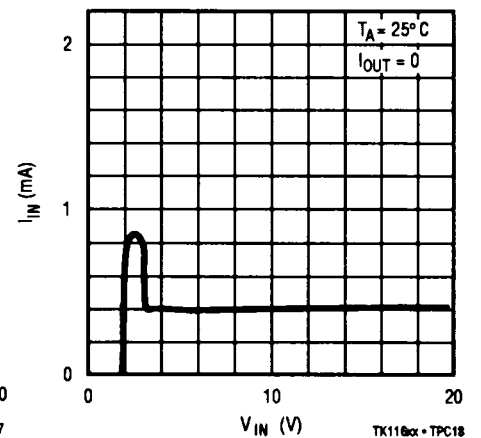
QUIESCENT CURRENT vs LOAD CURRENT



SHORT CIRCUIT PROTECTION

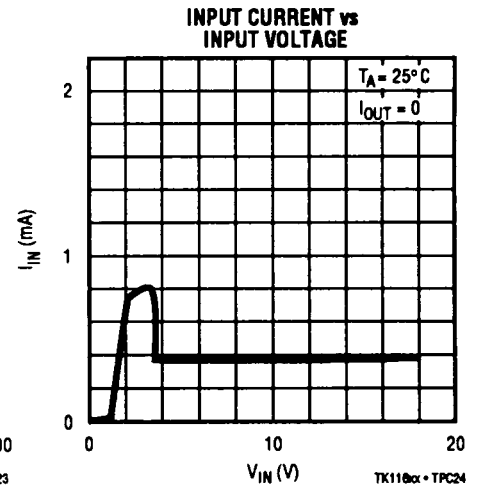
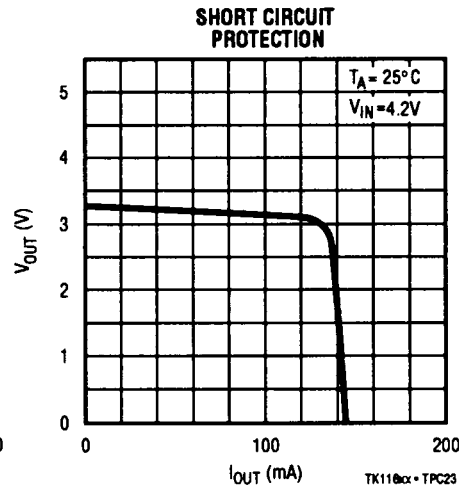
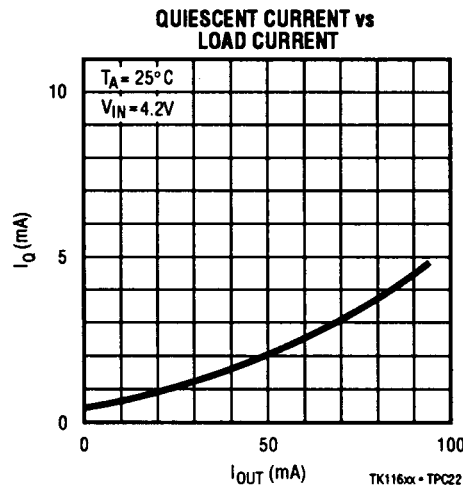
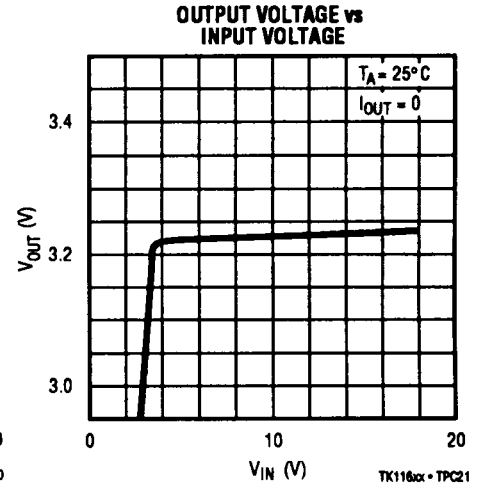
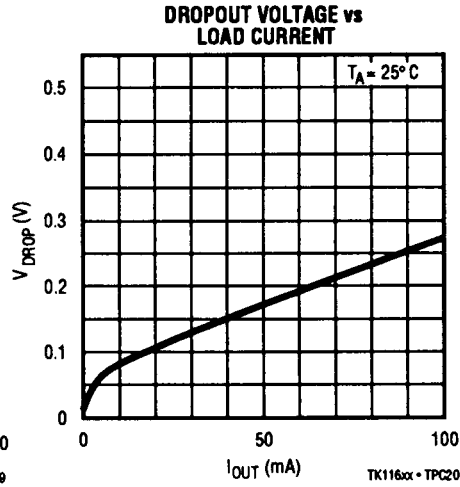
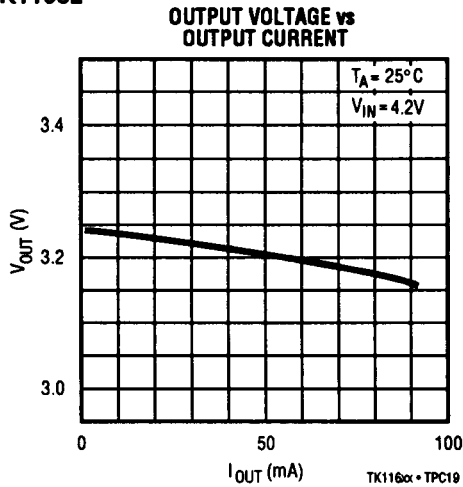


INPUT CURRENT vs INPUT VOLTAGE

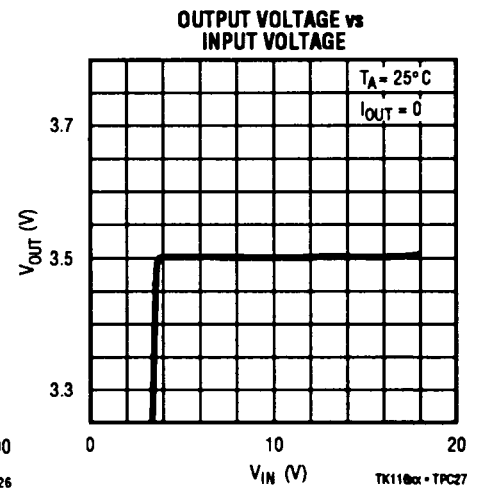
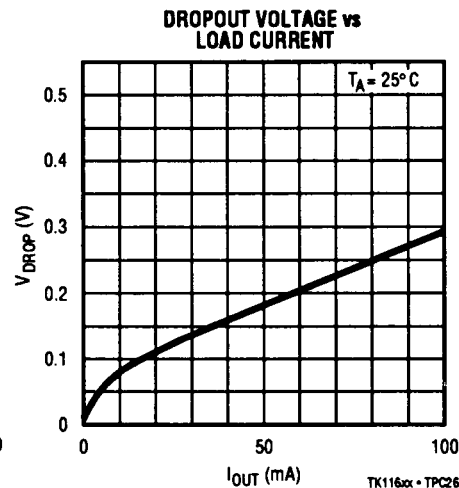
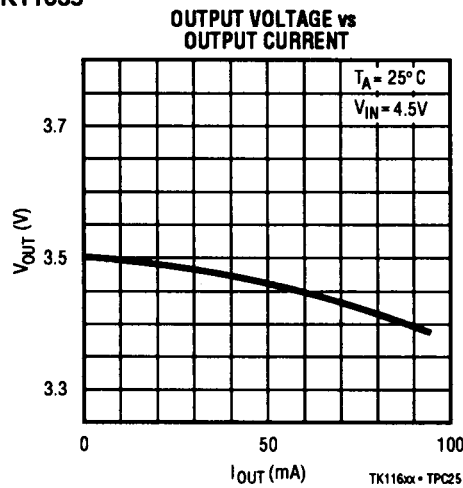


TYPICAL PERFORMANCE CHARACTERISTICS

TK11632

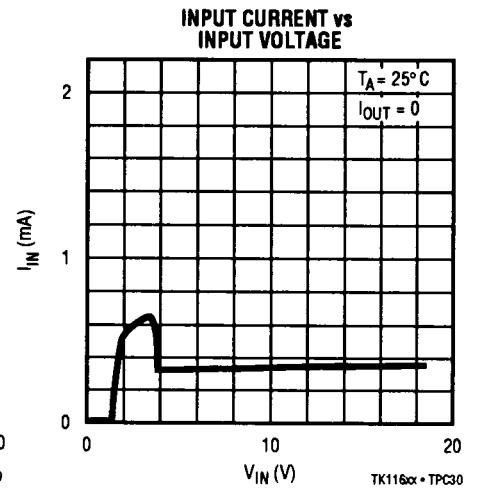
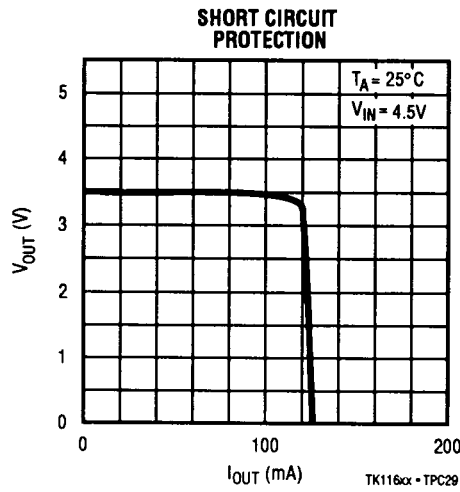
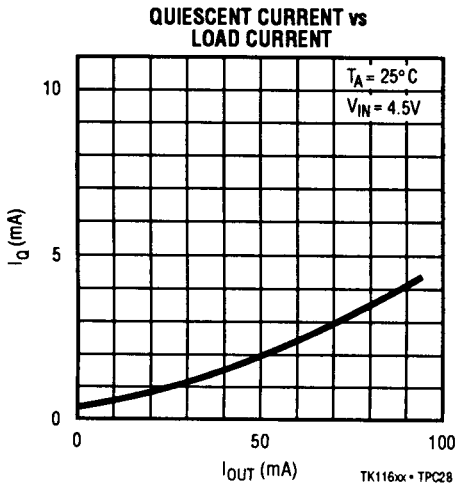


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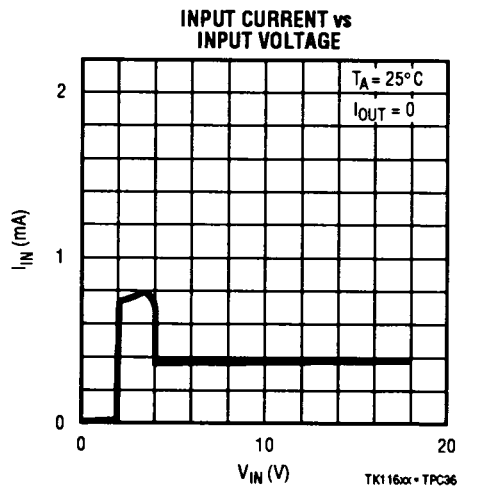
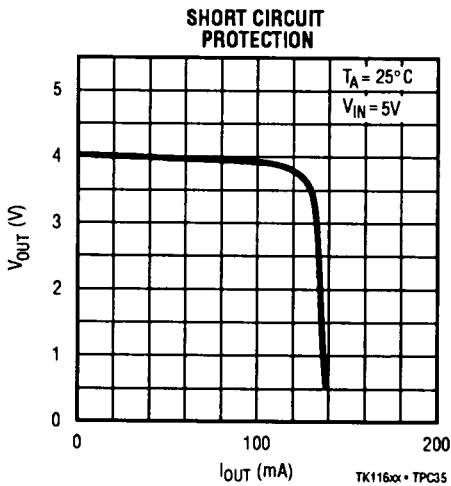
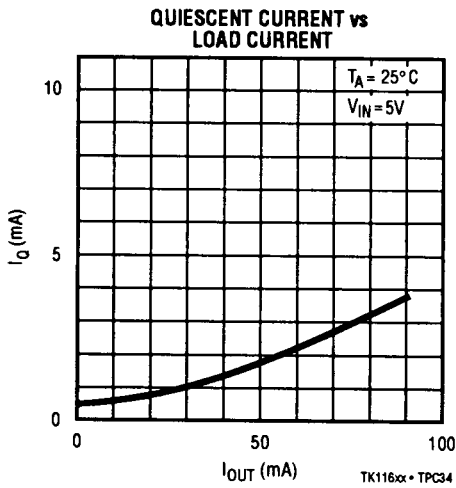
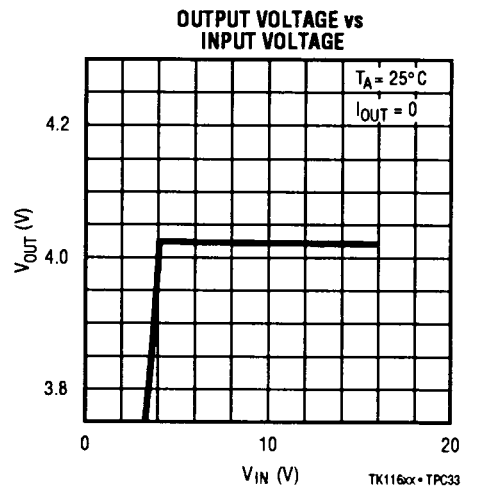
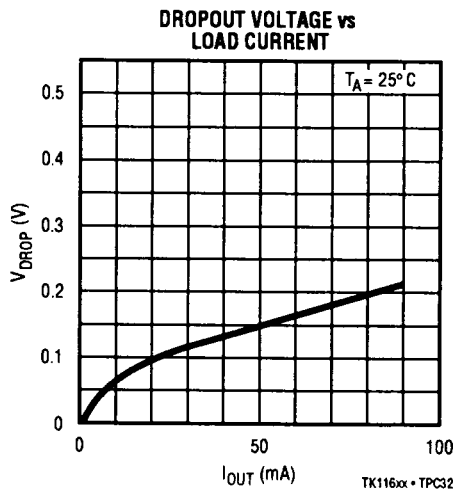
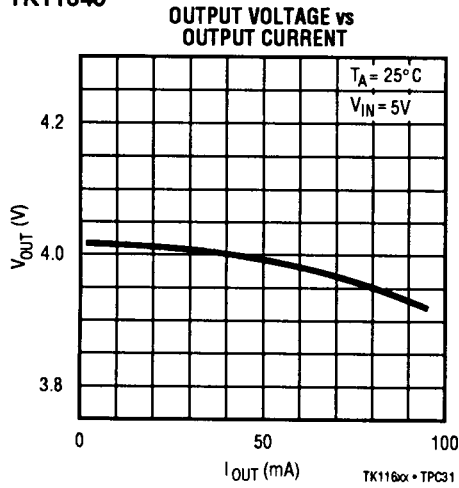


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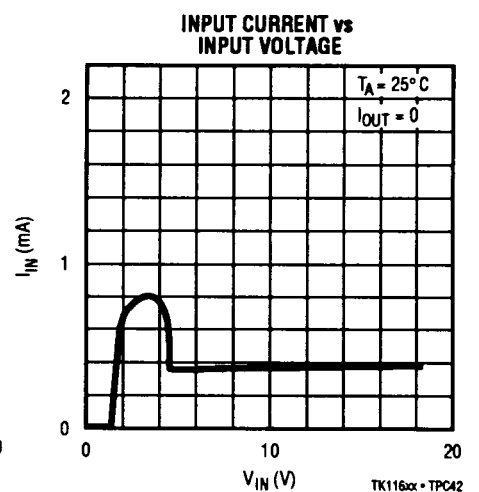
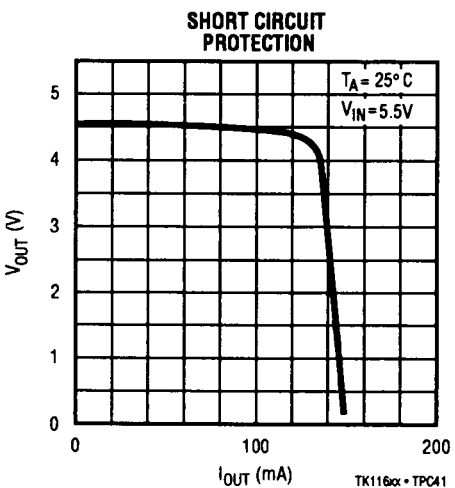
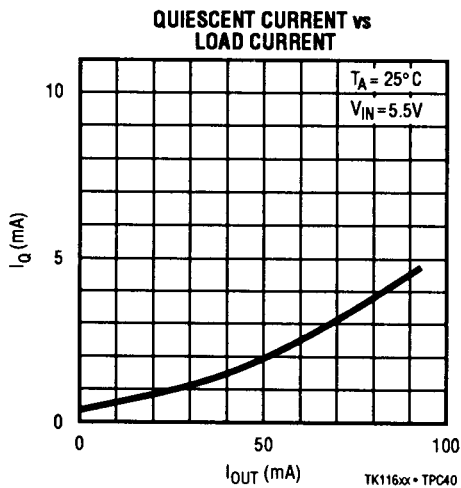
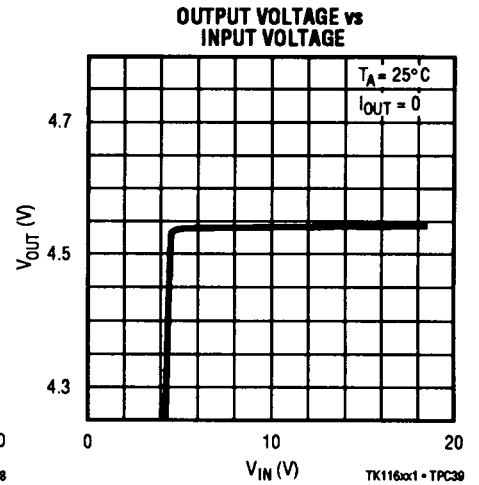
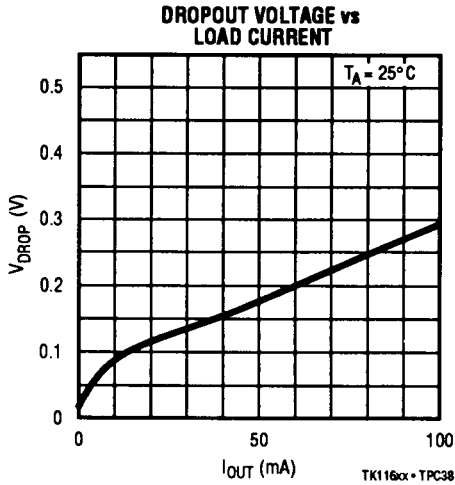
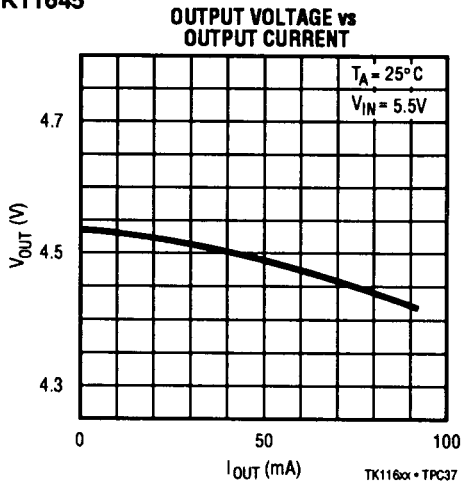


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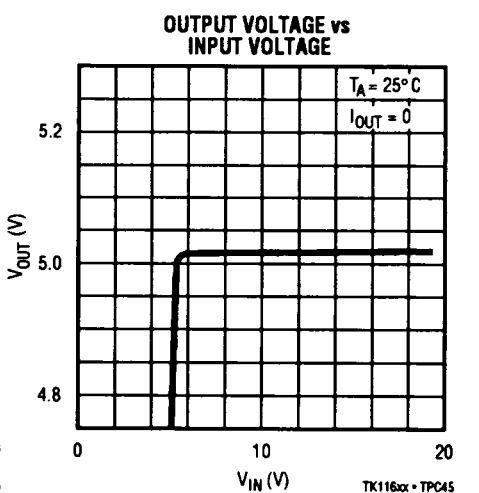
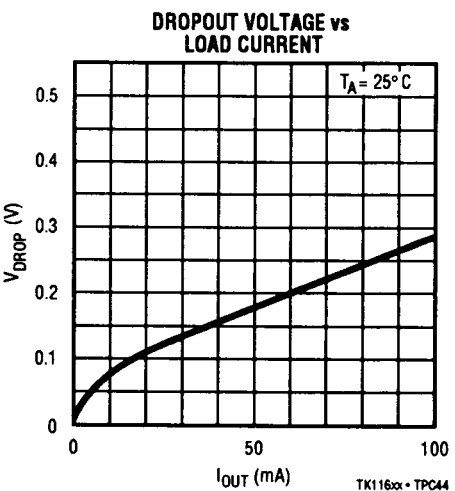
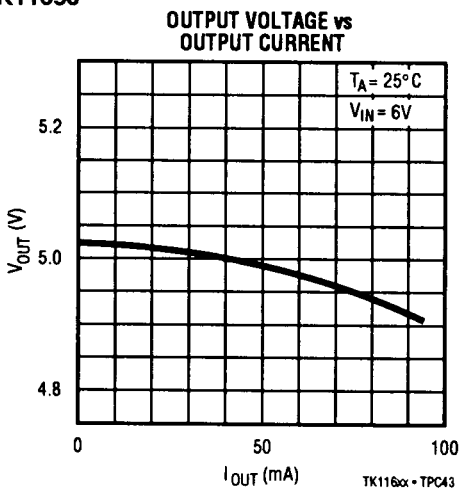


TYPICAL PERFORMANCE CHARACTERISTICS

TK11645



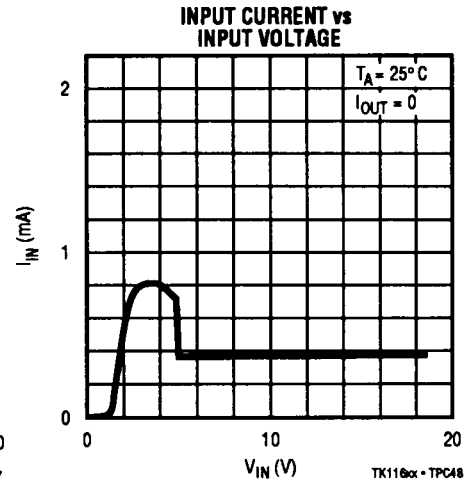
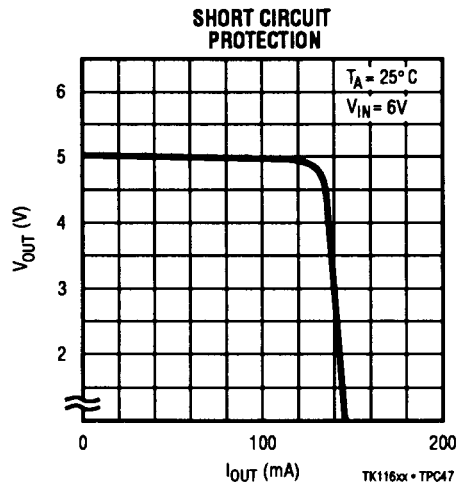
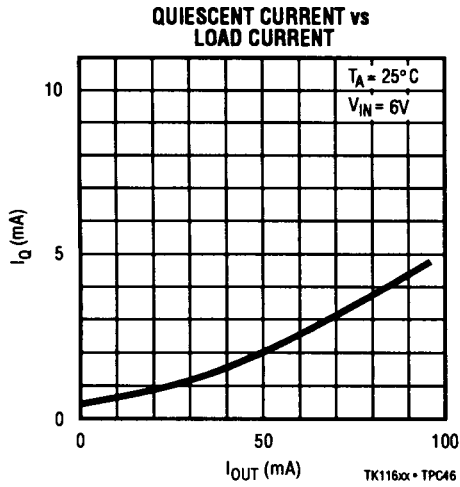
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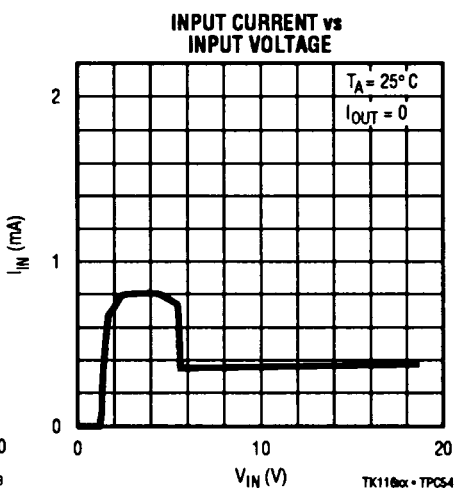
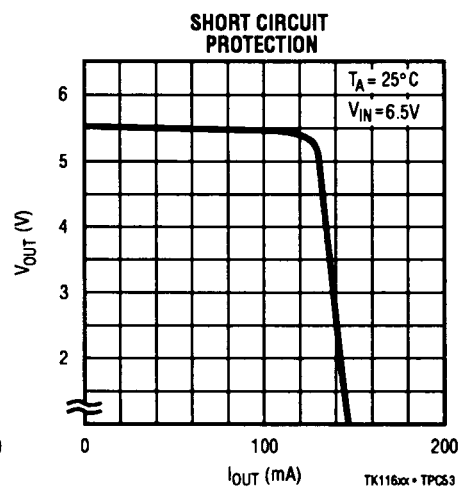
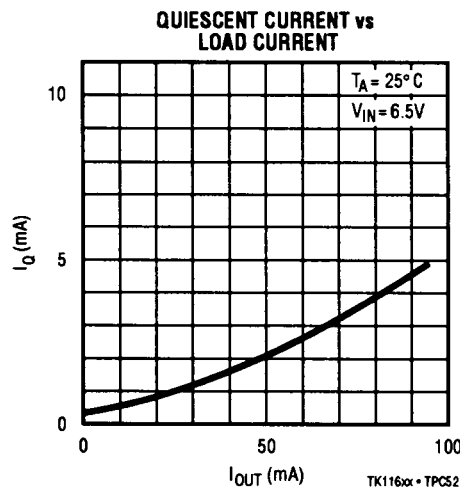
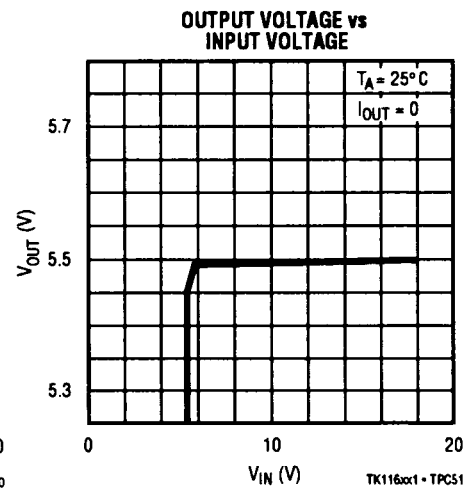
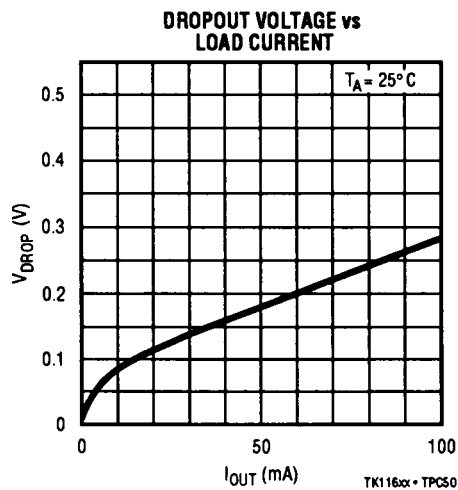
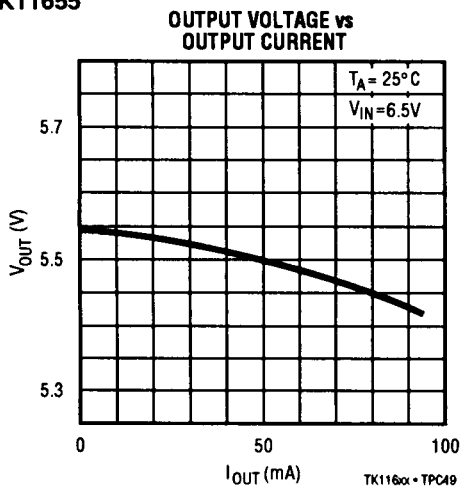
TK116xxU

TYPICAL PERFORMANCE CHARACTERISTICS

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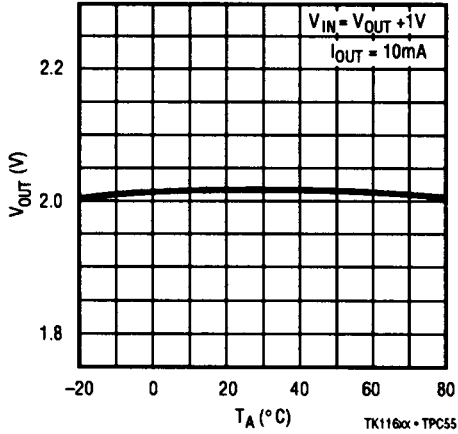


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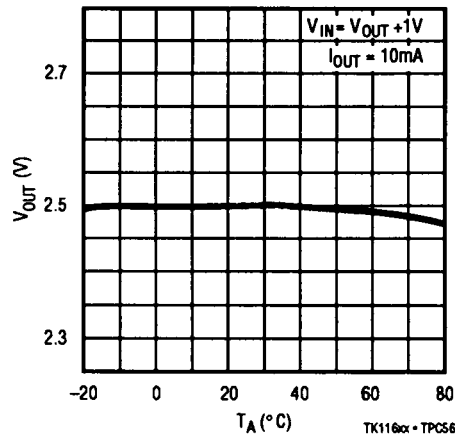


TYPICAL PERFORMANCE CHARACTERISTICS

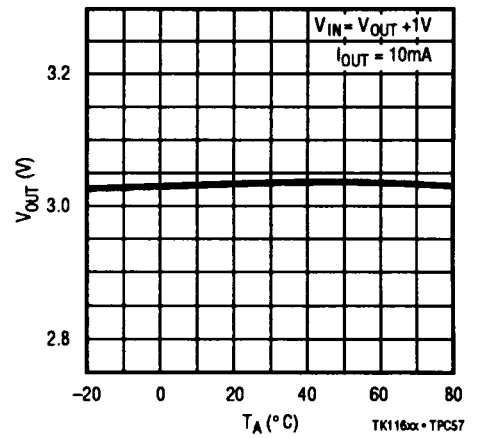
TK11620
OUTPUT VOLTAGE vs
TEMPERATURE



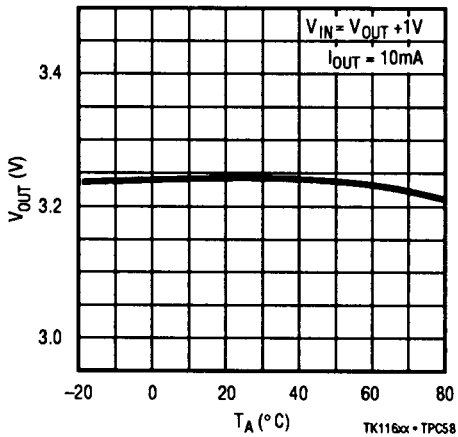
TK11625
OUTPUT VOLTAGE vs
TEMPERATURE



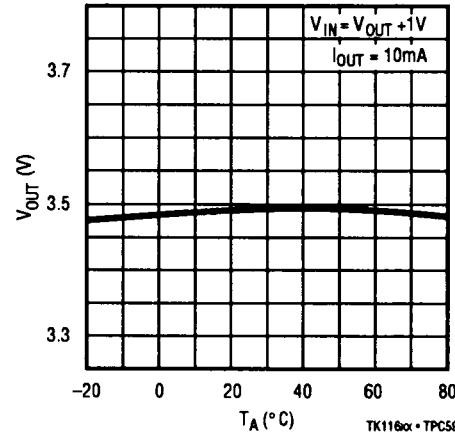
TK11630
OUTPUT VOLTAGE vs
TEMPERATURE



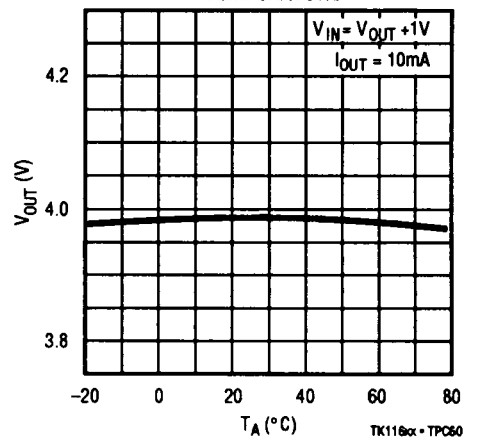
TK11632
OUTPUT VOLTAGE vs
TEMPERATURE



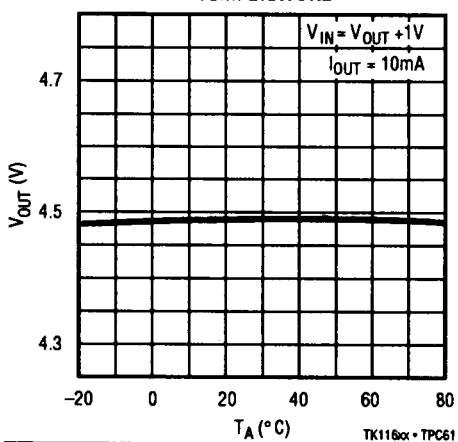
TK11635
OUTPUT VOLTAGE vs
TEMPERATURE



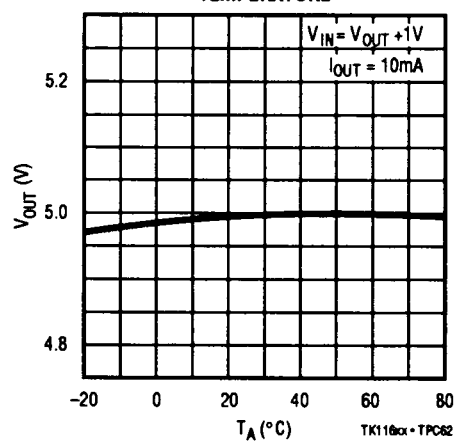
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OUTPUT VOLTAGE vs
TEMPERATURE



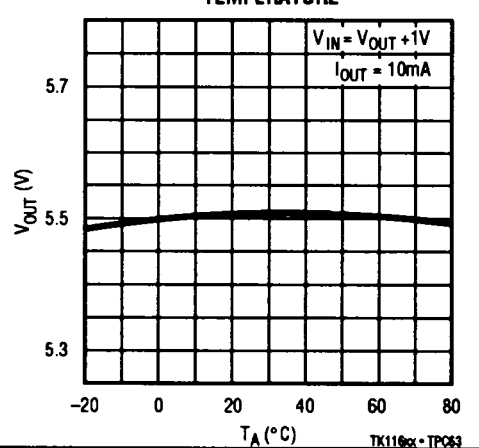
TK11645
OUTPUT VOLTAGE vs
TEMPERATURE



TK11650
OUTPUT VOLTAGE vs
TEMPERATURE

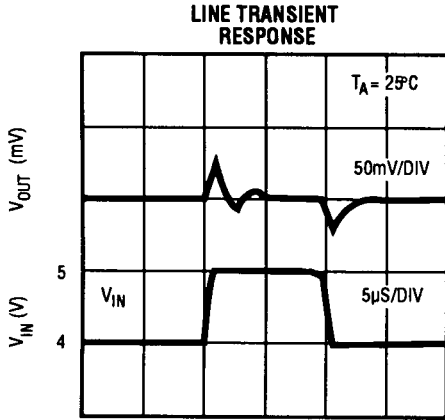


TK11655
OUTPUT VOLTAGE vs
TEMPERATURE

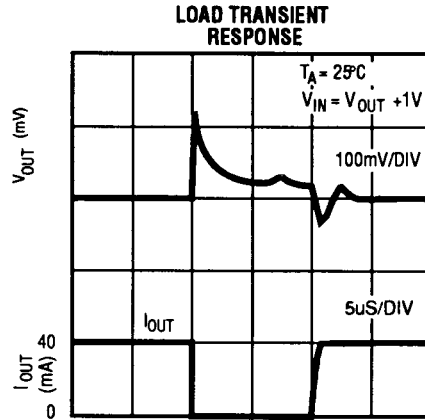


TYPICAL PERFORMANCE CHARACTERISTICS

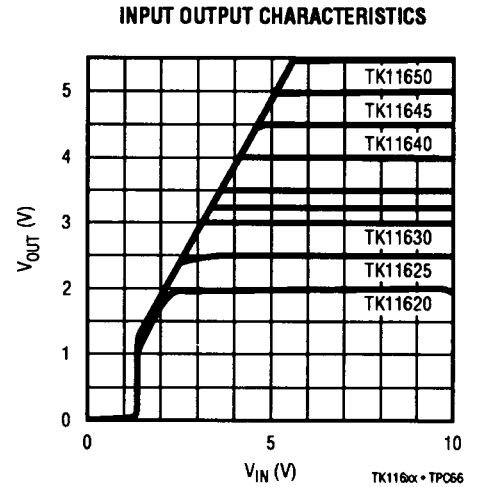
COMMON CHARACTERISTICS



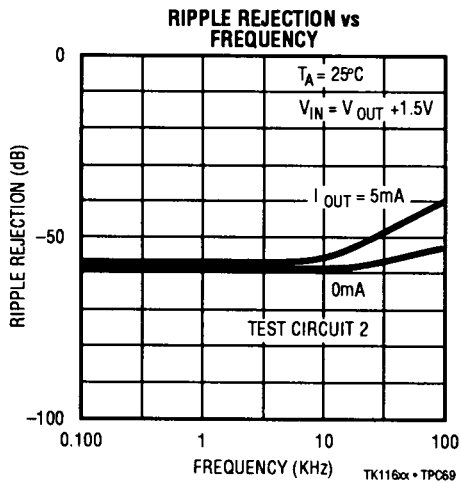
TK116xx • TPC64



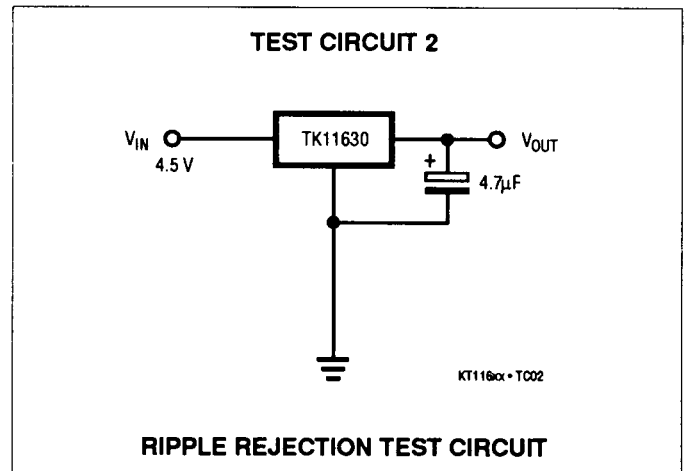
TK116xx • TPC65



TK116xx • TPC66



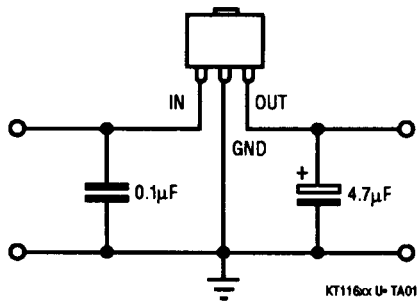
TK116xx • TPC69



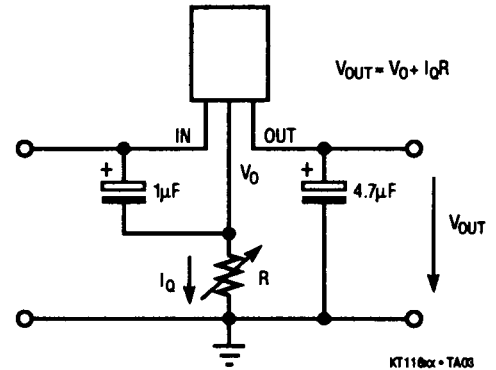
TK116xx • TC02

TYPICAL APPLICATIONS

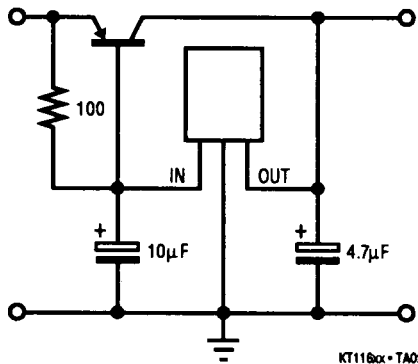
VOLTAGE REGULATOR CIRCUIT



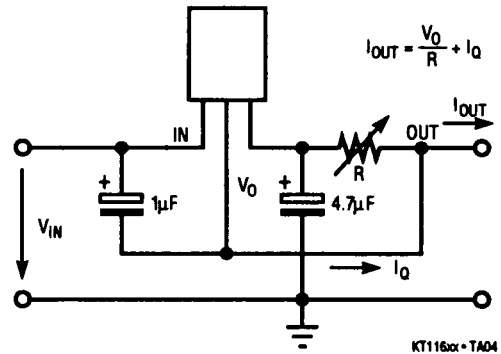
VOLTAGE BOOST CIRCUIT



CURRENT BOOST CIRCUIT



CURRENT REGULATOR CIRCUIT

**Application Hints**

Maximize copper foil area connecting to all IC pins for optimum heat conduction. Place input and output bypass capacitors close to the GND pin. For best transient behavior and lowest output impedance, use as large of a capacitor value as possible. The temperature coefficient of the capacitance and Equivalent Series Resistance (ESR) should be taken into account. These parameters can influence power supply noise and ripple rejection. In extreme cases, oscillation may occur. In order to maintain stability, the output bypass capacitor value should be minimum 1 μF in case of Tantalum electrolytic or 4.7 μF in case of Aluminium electrolytic at $T_A=25^\circ\text{C}$.

