



TK115xx

VOLTAGE REGULATOR WITH ON/OFF SWITCH

FEATURES

- Low Dropout Voltage
- Pass Transistor Terminals Available
- Very Low Standby Current (ON, No Load)
- Very Low (<200 nA) Current in OFF Mode
- Low Output Noise
- Internal Thermal Shutdown
- Short Circuit Protection
- Available on Tape and Reel

DESCRIPTION

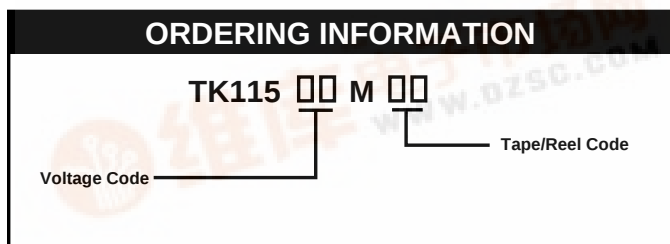
The TK115xx series devices are low power, linear regulators with electronic ON/OFF switches. Both active HIGH and active LOW control pins are provided.

An internal PNP pass-transistor is used in order to achieve low dropout voltage (typically 200 mV at 80 mA load current). A base drive is available at pin 7 for connection of an external pass transistor should higher current (up to 1 A) or lower dropout voltage is required.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	16 V
Load Current	180 mA
Power Dissipation (Note 1)	600 mW
Storage Temperature Range	-55 to +150 °C
Operating Temperature Range	-30 to +80 °C
Lead Soldering Temp. (10 sec.)	260 °C
Junction Temperature	150 °C

Note 1: Derate output power by 4.8 mW/°C for operation above 25 °C.



VOLTAGE CODE	
30 = 3.0 V	45 = 4.5 V
32 = 3.25 V	47 = 4.75 V
35 = 3.5 V	50 = 5.0 V
37 = 3.75 V	55 = 5.5 V
40 = 4.0 V	80 = 8.0 V

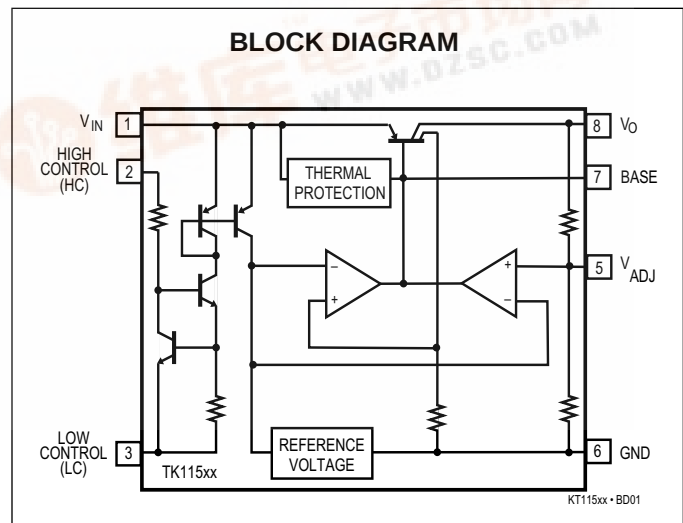
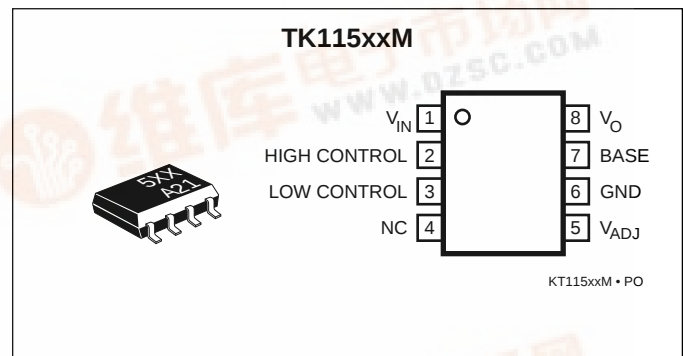
TAPE/REEL CODE	
BX : Bulk/Bag	
TL : Tape Left	
MG : Magazine	

APPLICATIONS

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

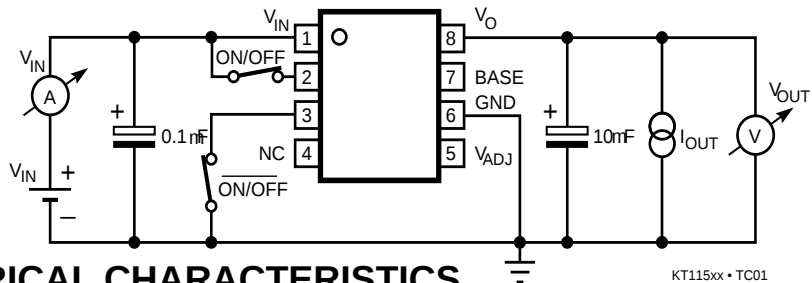
An internal thermal shutdown circuit limits the junction temperature to below 150 °C. The load current is internally monitored, and the device will shut down in the presence of a short circuit at the output.

The TK115xx series is available in plastic surface mount SOP-8 packages.



TK115xx

TEST CIRCUIT 1



KT115xx • TC01

TK11530 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 4.0 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 2.5 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 4.0 \text{ V}$, $I_O = 30 \text{ mA}$	2.9	3.0	3.1	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 2.7 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 4\text{V} \rightarrow 9 \text{ V}$		5.0	30	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 4.0 \text{ V}$ (Note 1)		18	50	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 4.0 \text{ V}$ (Note 1)		36	80	mV
RR	Ripple Regulation	100 mVrms, $f = 400 \text{ Hz}$, $V_{IN} = 4.5 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 4.5 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.3		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	10 Hz $\leq f \leq$ 100 kHz, $I_O = 10 \text{ mA}$		180		μVrms
I_B	Base Terminal Current	$V_{IN} = 4.0 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN} - 2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN} - 0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_J is constant. The output change due to temperature is not included.

TK11532 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 4.2 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 2.5 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 4.2 \text{ V}$, $I_O = 30 \text{ mA}$	3.15	3.25	3.35	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 2.95 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 4.2 \text{ V} \rightarrow 9.2 \text{ V}$		6.0	30	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 4.2 \text{ V}$ (Note 1)		20	50	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 4.2 \text{ V}$ (Note 1)		40	80	mV
RR	Ripple Regulation	100 mV_{rms} , $f = 400 \text{ Hz}$, $V_{IN} = 4.7 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 4.7 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.3		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$, $I_O = 10 \text{ mA}$		180		μV_{rms}
I_B	Base Terminal Current	$V_{IN} = 4.2 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

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TK11535 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 4.5 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 2.5 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 4.5 \text{ V}$, $I_O = 30 \text{ mA}$	3.38	3.5	3.62	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 3.2 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 4.5 \text{ V} \rightarrow 9.5 \text{ V}$		6.0	30	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 4.5 \text{ V}$ (Note 1)		20	55	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 4.5 \text{ V}$ (Note 1)		40	95	mV
RR	Ripple Regulation	100 mVrms, $f = 400 \text{ Hz}$, $V_{IN} = 5.0 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 5.0 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.3		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$, $I_O = 10 \text{ mA}$		180		μVrms
I_B	Base Terminal Current	$V_{IN} = 4.5 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

TK11537 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 4.75 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 3.3 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 4.75 \text{ V}$, $I_O = 30 \text{ mA}$	3.625	3.75	3.88	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 3.45 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 4.75 \text{ V} \rightarrow 9.75 \text{ V}$		6.0	30	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 4.75 \text{ V}$ (Note 1)		20	55	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 4.75 \text{ V}$ (Note 1)		40	95	mV
RR	Ripple Regulation	100 mVrms, $f = 400 \text{ Hz}$, $V_{IN} = 5.25 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 5.25 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.3		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$, $I_O = 10 \text{ mA}$		180		μVrms
I_B	Base Terminal Current	$V_{IN} = 4.75 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

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TK11540 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 5.0 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 3.0 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 5.0 \text{ V}$, $I_O = 30 \text{ mA}$	3.88	4.0	4.12	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 3.7 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 5.0 \text{ V} \rightarrow 10.0 \text{ V}$		8.0	40	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 5.0 \text{ V}$ (Note 1)		24	60	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 5.0 \text{ V}$ (Note 1)		48	100	mV
RR	Ripple Regulation	100 mVrms, $f = 400 \text{ Hz}$, $V_{IN} = 5.5 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 5.5 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.4		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$, $I_O = 10 \text{ mA}$		180		μVrms
I_B	Base Terminal Current	$V_{IN} = 5.0 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

TK11545 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 5.5 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 3.5 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 5.5 \text{ V}$, $I_O = 30 \text{ mA}$	4.36	4.5	4.64	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 4.2 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 5.5 \text{ V} \rightarrow 10.5 \text{ V}$		8.0	40	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 5.5 \text{ V}$ (Note 1)		25	65	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 5.5 \text{ V}$ (Note 1)		55	110	mV
RR	Ripple Regulation	100 mV_{rms} , $f = 400 \text{ Hz}$, $V_{IN} = 6.0 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 6.0 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.5		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$, $I_O = 10 \text{ mA}$		180		μV_{rms}
I_B	Base Terminal Current	$V_{IN} = 5.5 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

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TK11547 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 5.7 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 3.7 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 5.7 \text{ V}$, $I_O = 30 \text{ mA}$	4.6	4.75	4.9	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 4.45 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 5.7 \text{ V} \rightarrow 10.7 \text{ V}$		8.0	40	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 5.7 \text{ V}$ (Note 1)		25	70	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 5.7 \text{ V}$ (Note 1)		50	120	mV
RR	Ripple Regulation	100 mV_{rms} , $f = 400 \text{ Hz}$, $V_{IN} = 6.2 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 6.2 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.6		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$, $I_O = 10 \text{ mA}$		180		μV_{rms}
I_B	Base Terminal Current	$V_{IN} = 5.7 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

TK11550 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 6.0\text{ V}$, $I_O = 0\text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 4.0\text{ V}$, $I_O = 0\text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14\text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 6.0\text{ V}$, $I_O = 30\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$	4.85	5.0	5.15	V
V_{DROP}	Voltage Dropout	$I_O = 60\text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 4.7\text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 6.0\text{ V} \rightarrow 11\text{ V}$		8.0	40	mV
LoaReg	Load Regulation	$I_O = 0\text{ to }30\text{ mA}$, $V_{IN} = 6.0\text{ V}$ (Note 1)		25	70	mV
		$I_O = 0\text{ to }60\text{ mA}$, $V_{IN} = 6.0\text{ V}$ (Note 1)		50	120	mV
RR	Ripple Regulation	100 mVrms, $f = 400\text{ Hz}$, $V_{IN} = 6.5\text{ V}$, $I_O = 10\text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 6.5\text{ V}$, $I_O = 10\text{ mA}$, $-20\text{ }^\circ\text{C} \leq T_A \leq 75\text{ }^\circ\text{C}$		± 0.6		mV/ $^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10\text{ Hz} \leq f \leq 100\text{ kHz}$, $I_O = 10\text{ mA}$		180		μVrms
I_B	Base Terminal Current	$V_{IN} = 6.0\text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

TK115xx

TK11555 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 6.5 \text{ V}$, $I_O = 0 \text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 4.5 \text{ V}$, $I_O = 0 \text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14 \text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 6.5 \text{ V}$, $I_O = 30 \text{ mA}$	5.225	5.5	5.665	V
V_{DROP}	Voltage Dropout	$I_O = 60 \text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 5.2 \text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 6.5 \text{ V} \rightarrow 11.5 \text{ V}$		8.0	40	mV
LoaReg	Load Regulation	$I_O = 0 \text{ to } 30 \text{ mA}$, $V_{IN} = 6.5 \text{ V}$ (Note 1)		25	70	mV
		$I_O = 0 \text{ to } 60 \text{ mA}$, $V_{IN} = 6.5 \text{ V}$ (Note 1)		50	120	mV
RR	Ripple Regulation	100 mVrms, $f = 400 \text{ Hz}$, $V_{IN} = 7.0 \text{ V}$, $I_O = 10 \text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 7.0 \text{ V}$, $I_O = 10 \text{ mA}$, $-20^\circ\text{C} \leq T_A \leq 75^\circ\text{C}$		± 0.6		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$, $I_O = 10 \text{ mA}$		180		μVrms
I_B	Base Terminal Current	$V_{IN} = 6.5 \text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

TK11580 ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Supply Current 1	$V_{IN} = 9.0\text{ V}$, $I_O = 0\text{ mA}$		500	900	μA
I_{CC2}	Supply Current 2	$V_{IN} = 7.0\text{ V}$, $I_O = 0\text{ mA}$		1.4	2.5	mA
I_{CCS}	Standby Supply Current	$V_{IN} = 14\text{ V}$, Output Off		0.2	2.0	μA
V_O	Output Voltage	$V_{IN} = 9.0\text{ V}$, $I_O = 30\text{ mA}$	7.76	8.0	8.24	V
V_{DROP}	Voltage Dropout	$I_O = 60\text{ mA}$		0.13	0.35	V
I_O	Output Current	$V_O = 7.7\text{ V}$	100	130		mA
I_{OR}	Recommended Output Current				100	mA
LinReg	Line Regulation	$V_{IN} = 9.0\text{ V} \rightarrow 14.0\text{ V}$		16.0	40	mV
LoaReg	Load Regulation	$I_O = 0\text{ to }30\text{ mA}$, $V_{IN} = 9.0\text{ V}$ (Note 1)		35	110	mV
		$I_O = 0\text{ to }60\text{ mA}$, $V_{IN} = 9.0\text{ V}$ (Note 1)		70	200	mV
RR	Ripple Regulation	100 mV_{rms} , $f = 400\text{ Hz}$, $V_{IN} = 9.5\text{ V}$, $I_O = 10\text{ mA}$		55		dB
$\Delta V_O / \Delta T_A$	V_O Temperature Coefficient	$V_{IN} = 9.5\text{ V}$, $I_O = 10\text{ mA}$, $-20\text{ }^\circ\text{C} \leq T_A \leq 75\text{ }^\circ\text{C}$		± 1.0		$\text{mV}/^\circ\text{C}$
V_{NO}	Output Noise Voltage	$10\text{ Hz} \leq f \leq 100\text{ kHz}$, $I_O = 10\text{ mA}$		180		μV_{rms}
I_B	Base Terminal Current	$V_{IN} = 9.0\text{ V}$	6	14	35	mA
Active High Control Terminal						
I_{HC}	HC Terminal Current	Output On, Connect LC & GND		2	40	μA
V_{HC1}	HC Terminal Voltage 1	Output On, Connect LC & GND	2.4		V_{IN}	V
V_{HC2}	HC Terminal Voltage 2	Output Off, Connect LC & GND	0		0.6	V
Active Low Control Terminal						
I_{LC}	LC Terminal Current	Output On, Connect HC & GND		35	120	μA
V_{LC1}	LC Terminal Voltage 1	Output On, Connect HC & GND	0		$V_{IN}-2.5$	V
V_{LC2}	LC Terminal Voltage 2	Output Off, Connect HC & GND	$V_{IN}-0.2$		V_{IN}	V

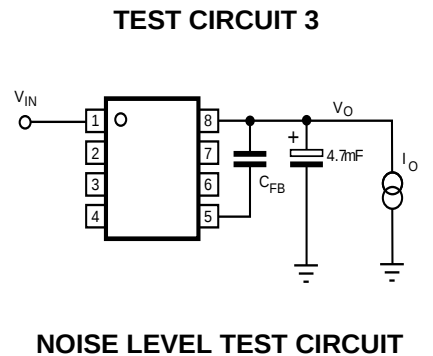
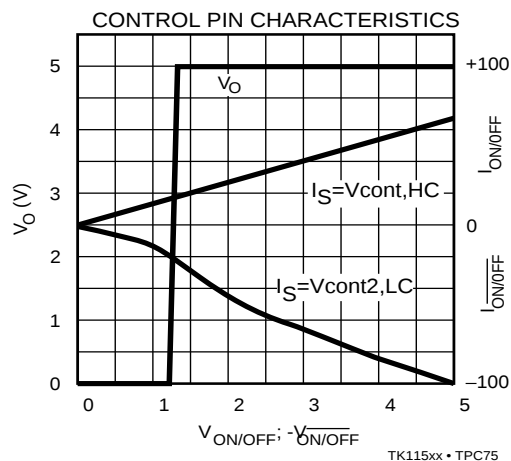
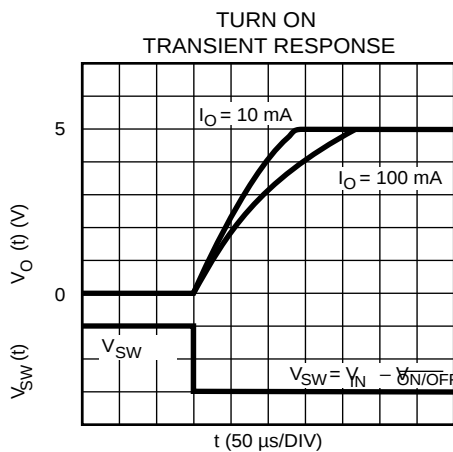
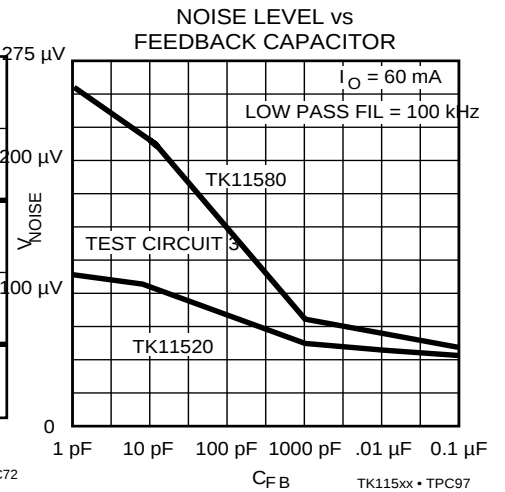
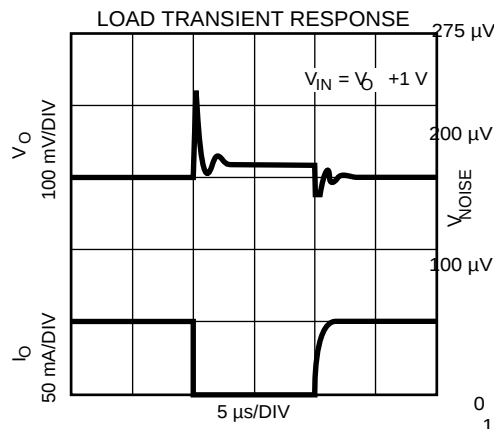
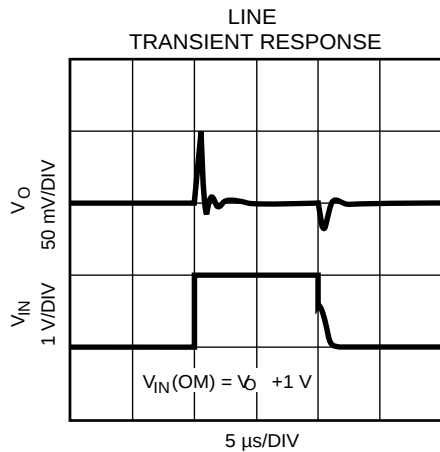
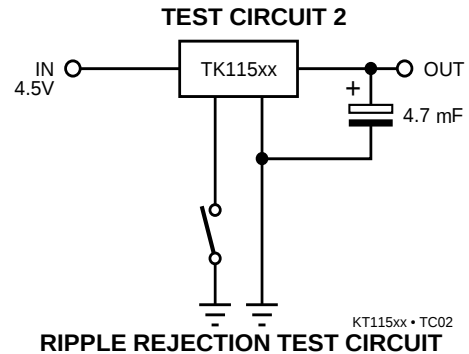
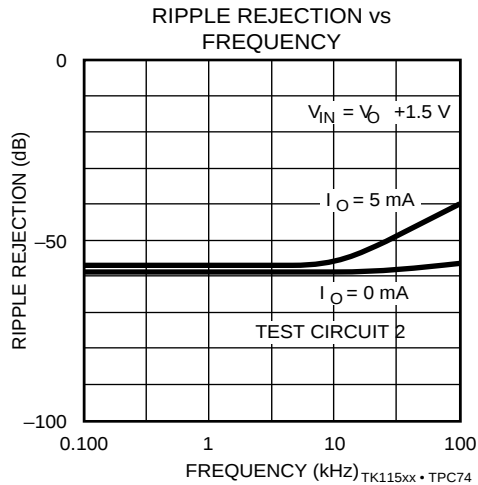
Note 1: This is a pulse measurement where T_j is constant. The output change due to temperature is not included.

TK115xx

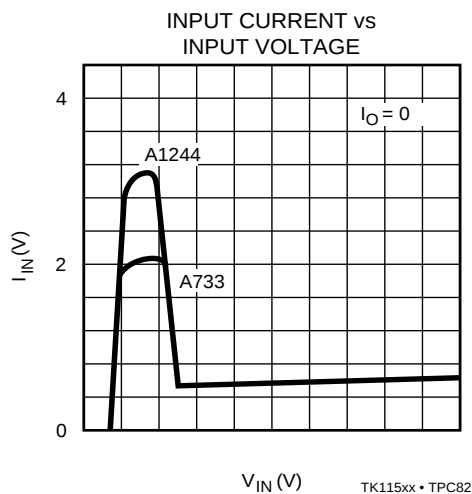
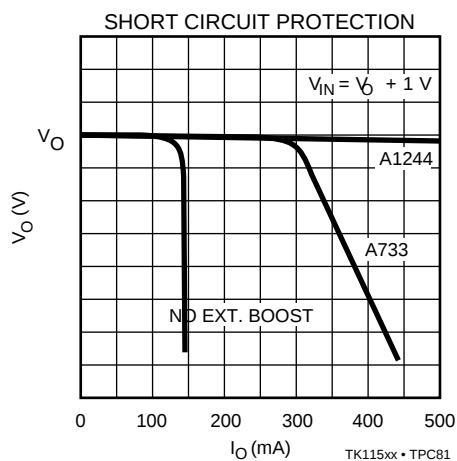
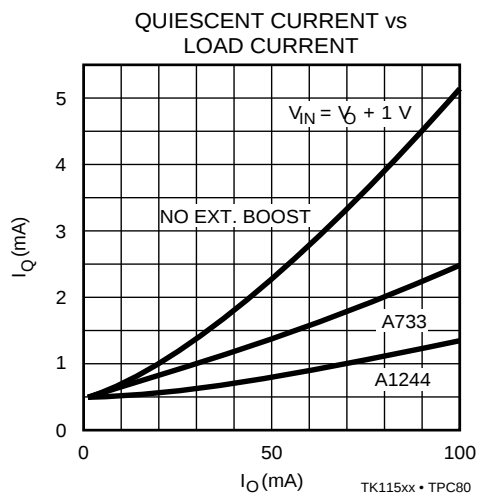
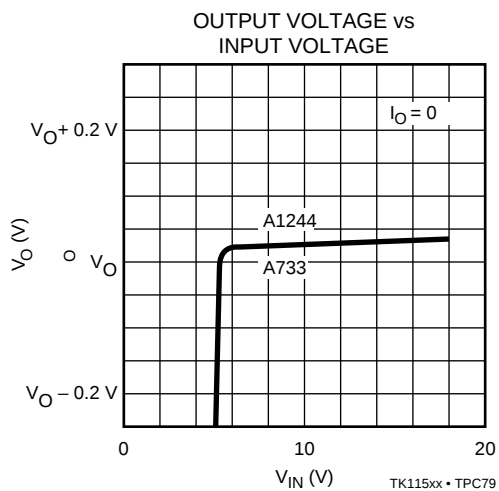
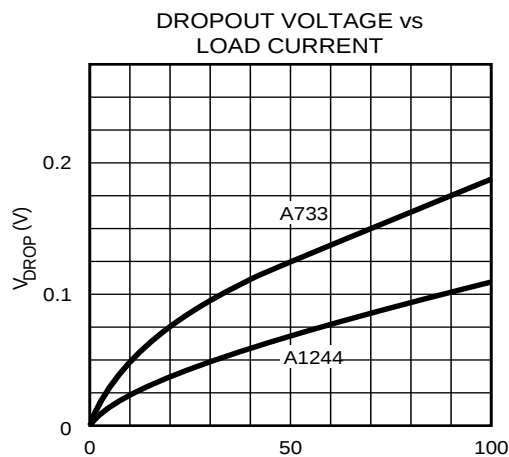
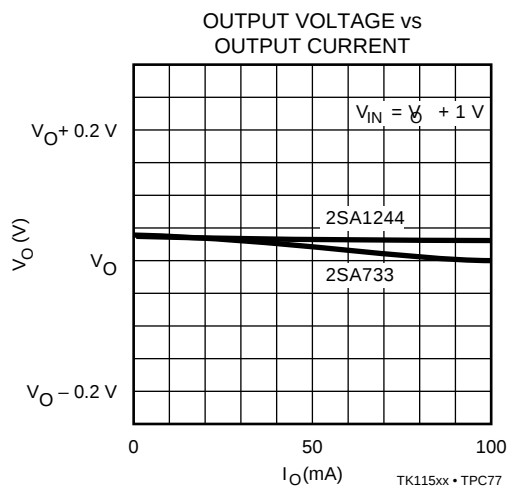
TYPICAL PERFORMANCE CHARACTERISTICS

COMMON CHARACTERISTICS

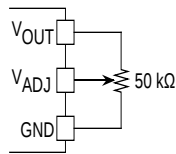
$T_A = 25^\circ\text{C}$ unless otherwise specified



COMMON CHARACTERISTICS WITH EXTERNAL CURRENT BOOST TRANSISTOR (NEC 2SA733 OR TOSHIBA 2SA1244)

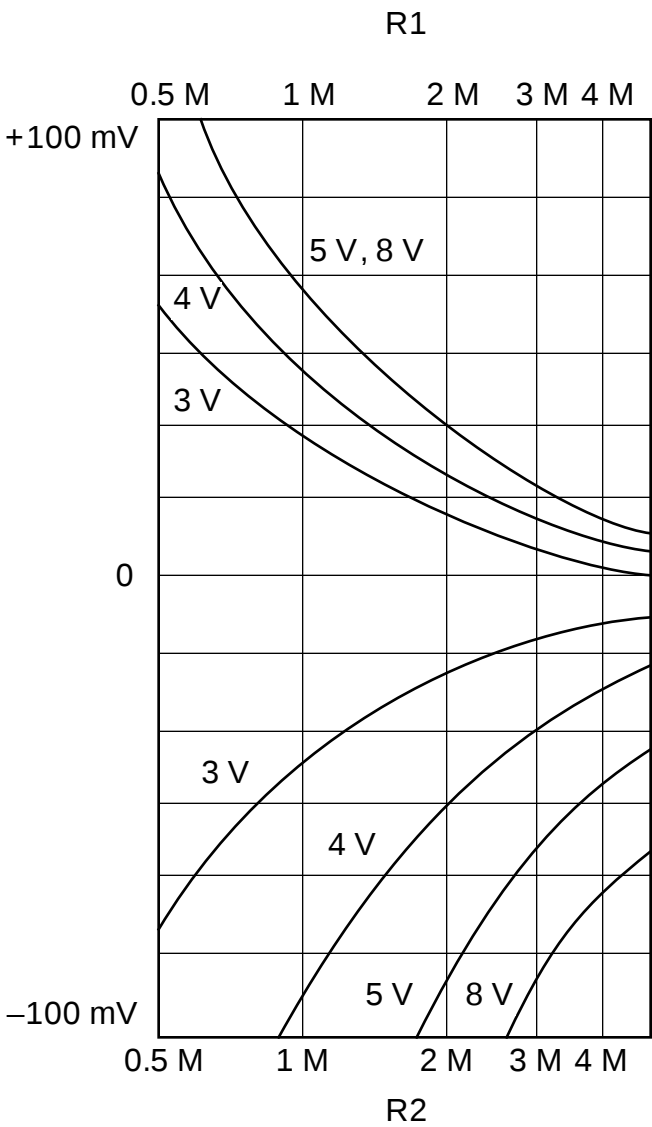
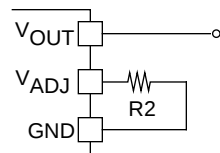
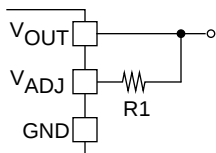
 $T_A = 25^\circ\text{C}$ unless otherwise specified

VOLTAGE ADJUSTMENT

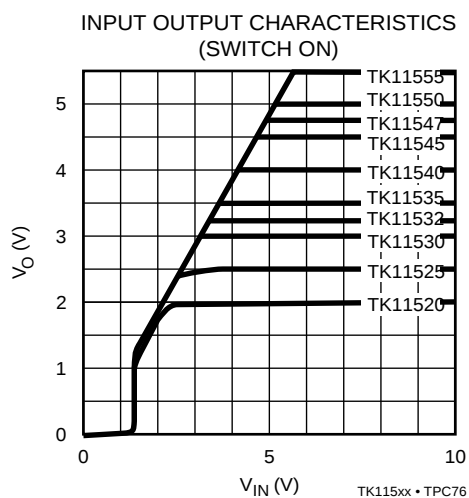
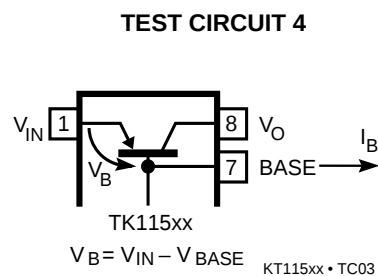
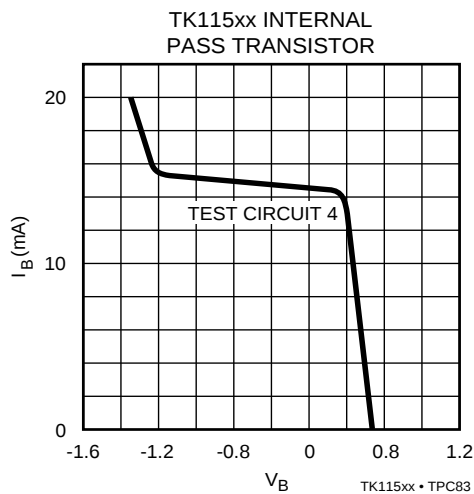


For large adjustment range use a 50 K potentiometer. This method gives good results when a voltage lower than the rated output is needed.

For small changes in output voltage use R1 to increase the output voltage or R2 to decrease the output voltage. The graph at right shows the approximate resistance values. The initial output voltage is indicated on the graph. (3 V = TK11530 etc.)



$T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified



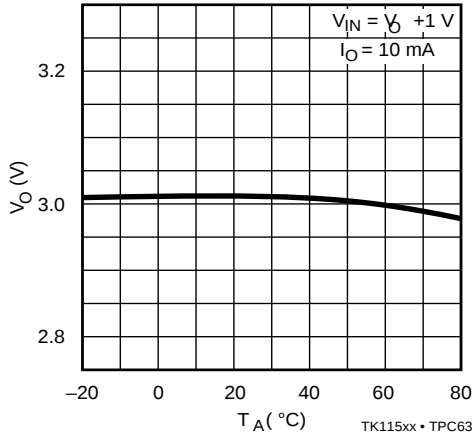
TK115xx

TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

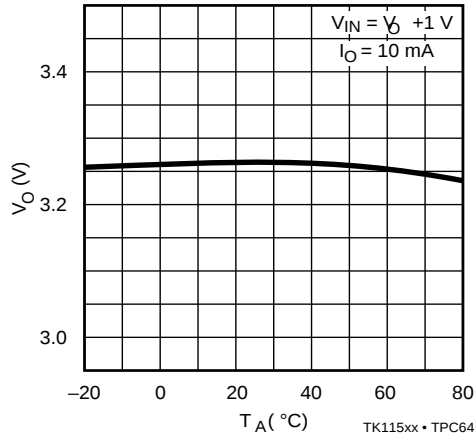
TEMPERATURE CHARACTERISTICS

$T_A = 25^\circ\text{C}$ unless otherwise specified

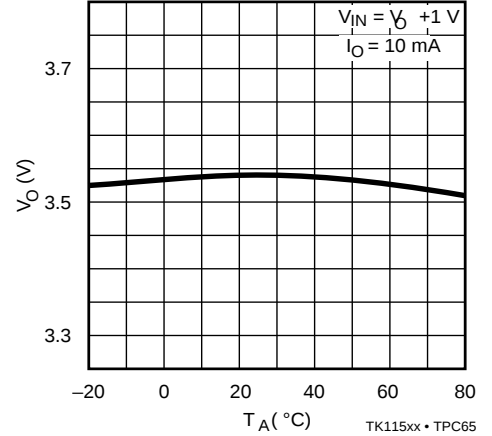
TK11530
OUTPUT VOLTAGE vs
TEMPERATURE



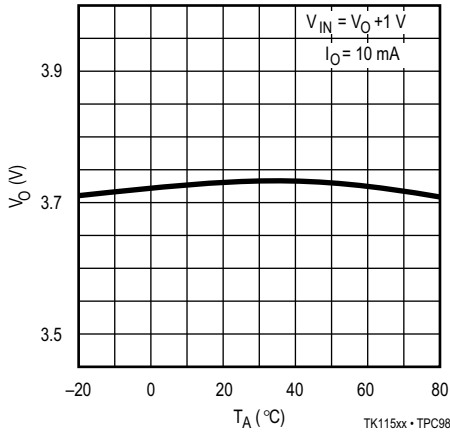
TK11532
OUTPUT VOLTAGE vs
TEMPERATURE



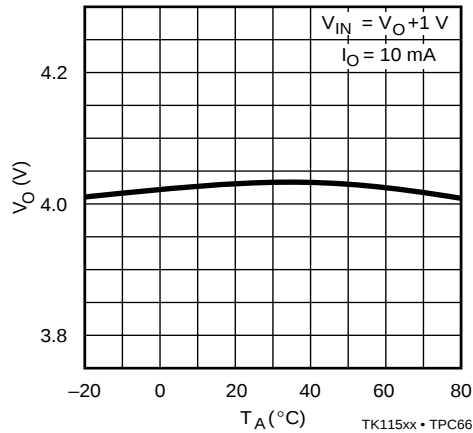
TK11535
OUTPUT VOLTAGE vs
TEMPERATURE



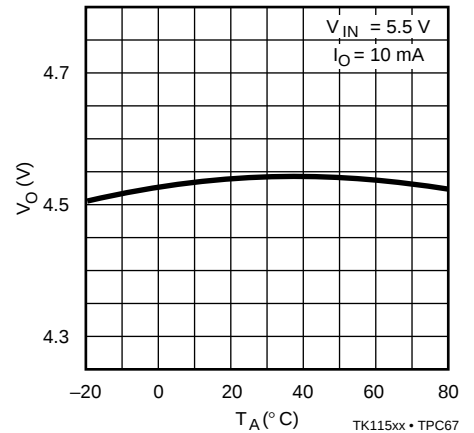
TK11537
OUTPUT VOLTAGE vs
TEMPERATURE



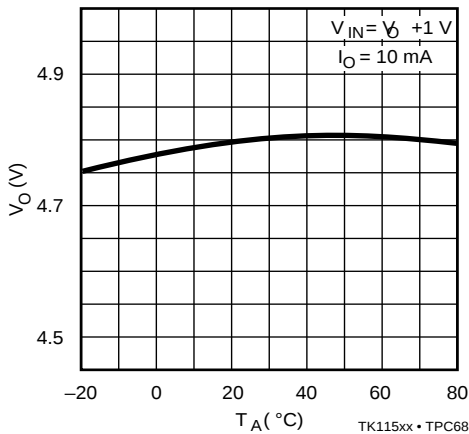
TK11540
OUTPUT VOLTAGE vs
TEMPERATURE



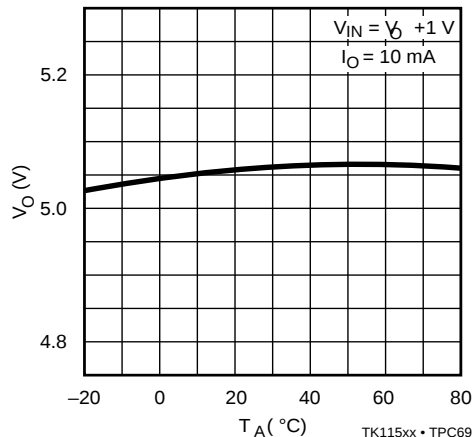
TK11545
OUTPUT VOLTAGE vs
TEMPERATURE



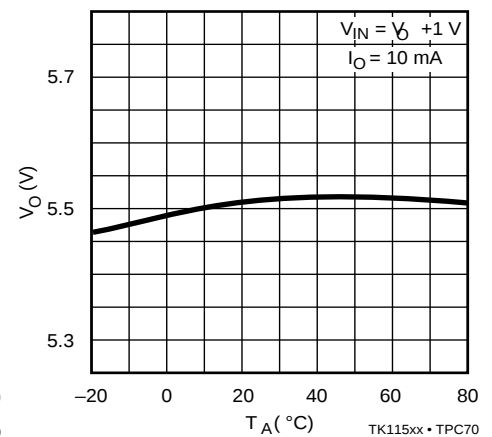
TK11547
OUTPUT VOLTAGE vs
TEMPERATURE



TK11550
OUTPUT VOLTAGE vs
TEMPERATURE

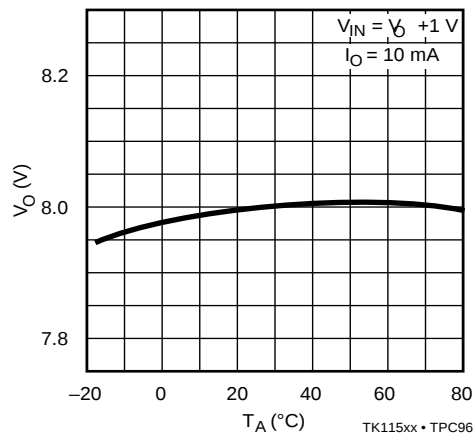


TK11555
OUTPUT VOLTAGE vs
TEMPERATURE

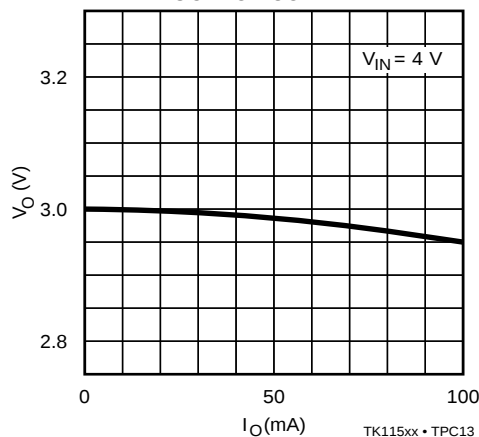
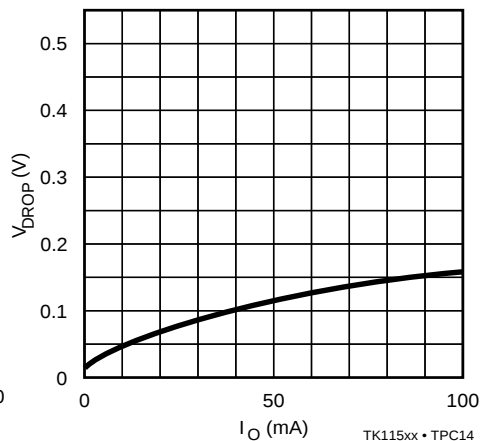
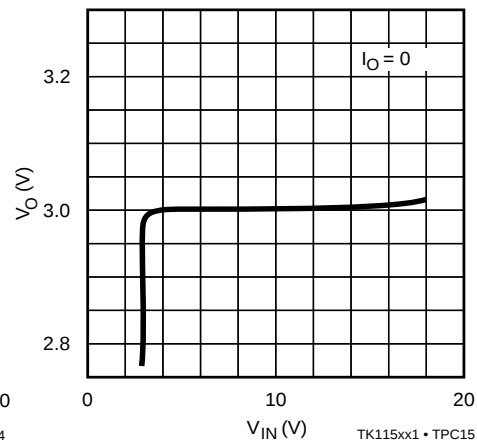
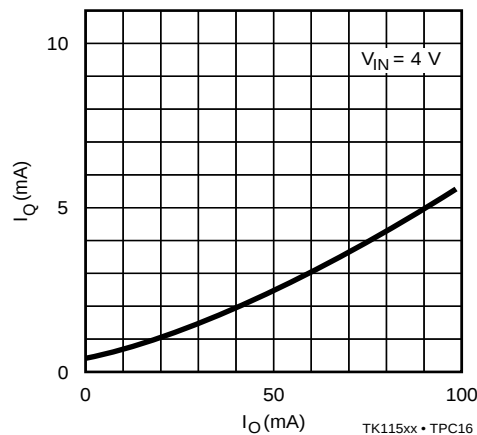
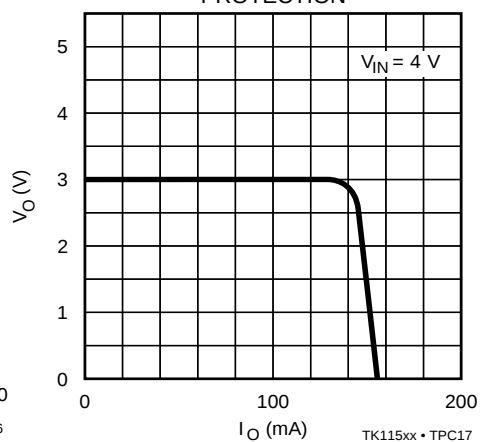
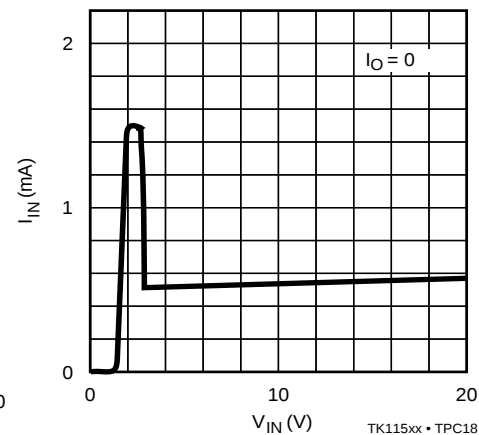


TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

TEMPERATURE CHARACTERISTICS (CONT.)

 $T_A = 25\text{ }^\circ\text{C}$ unless otherwise specifiedTK11580
OUTPUT VOLTAGE vs
TEMPERATURE

TK11530

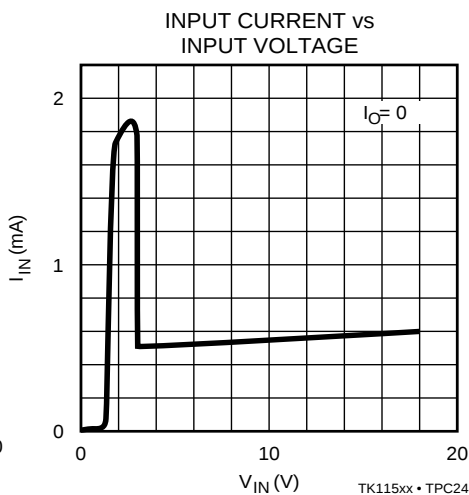
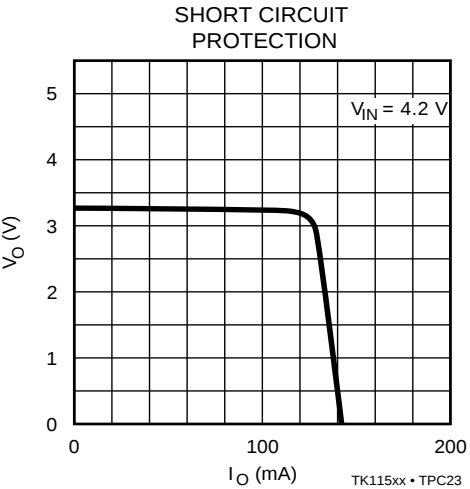
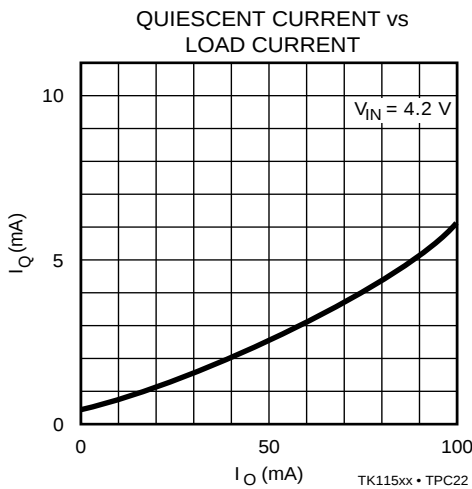
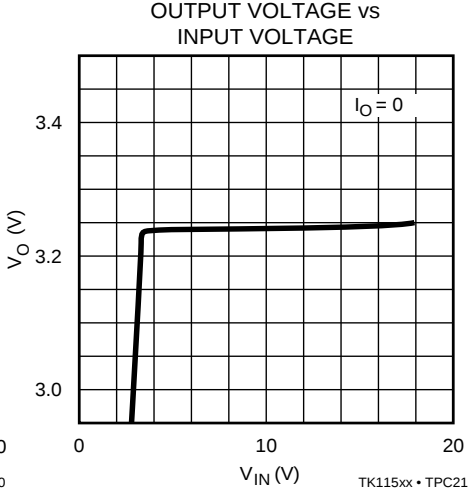
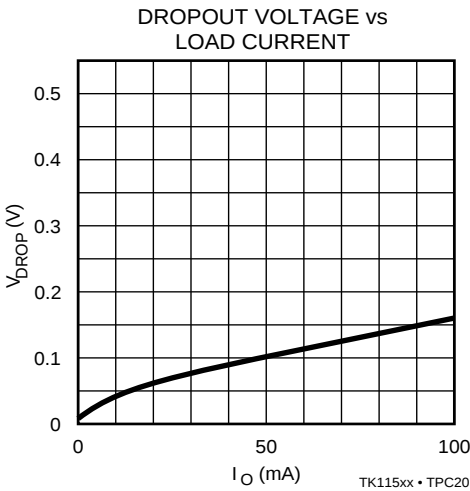
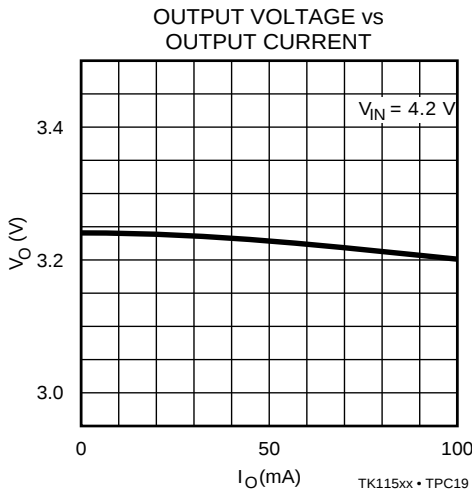
OUTPUT VOLTAGE vs
OUTPUT CURRENTDROPOUT VOLTAGE vs
LOAD CURRENTOUTPUT VOLTAGE vs
INPUT VOLTAGEQUIESCENT CURRENT vs
LOAD CURRENTSHORT CIRCUIT
PROTECTIONINPUT CURRENT vs
INPUT VOLTAGE

TK115xx

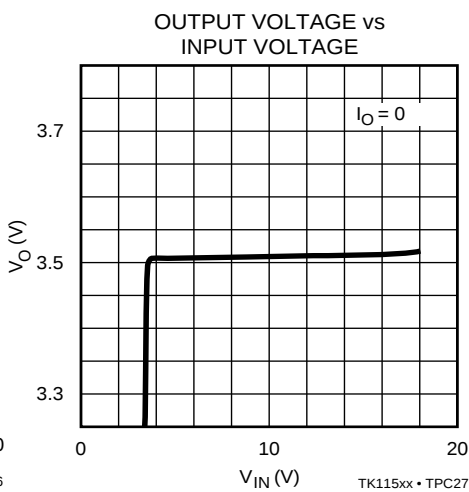
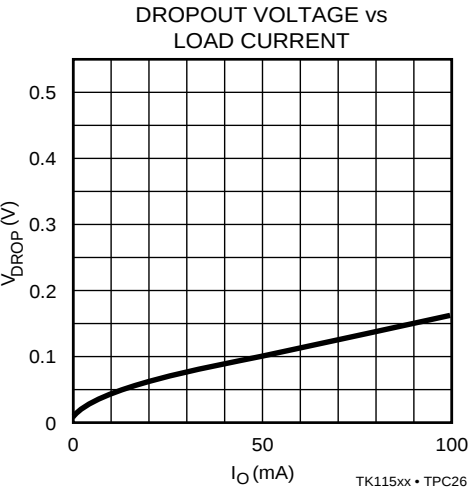
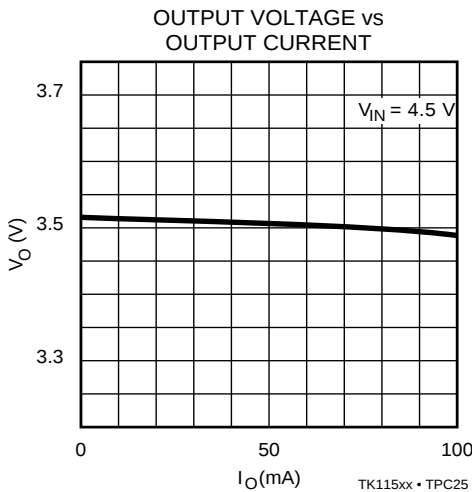
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

TK11532

T_A = 25 °C unless otherwise specified

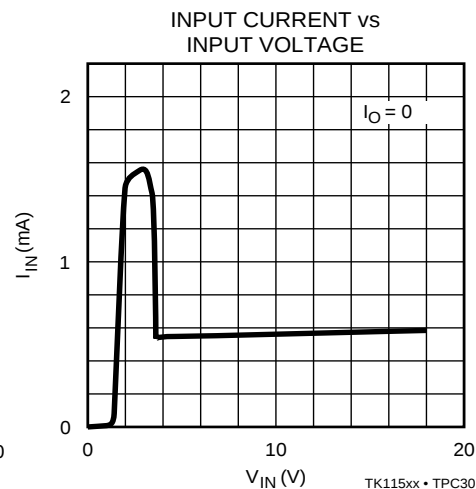
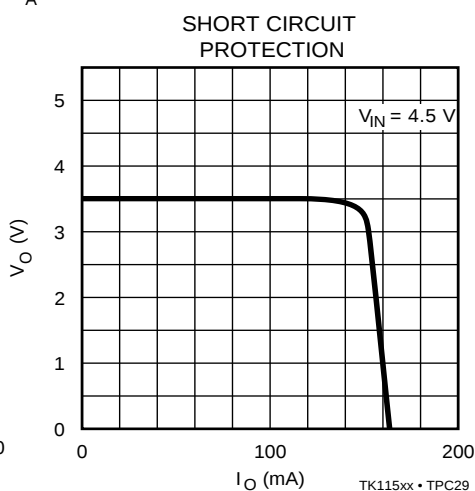
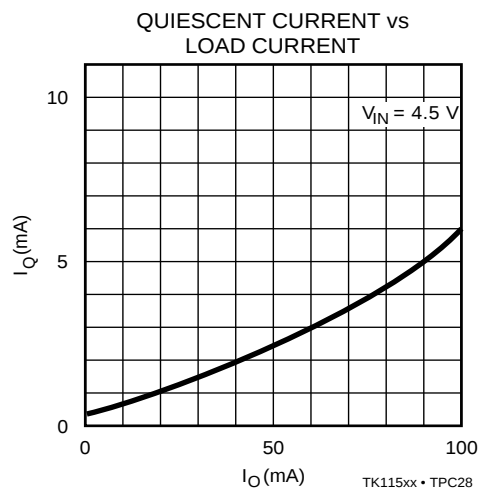


TK11535

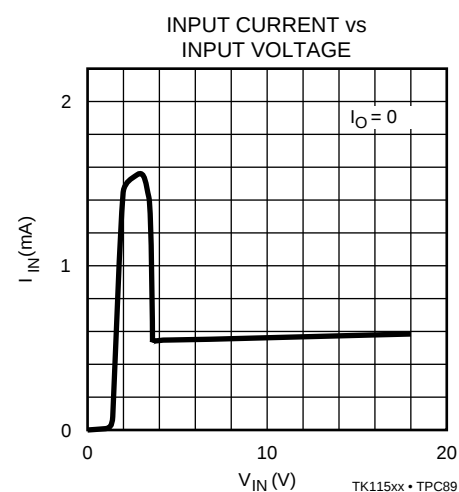
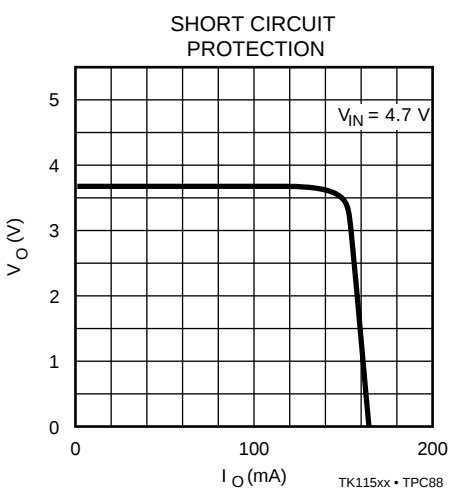
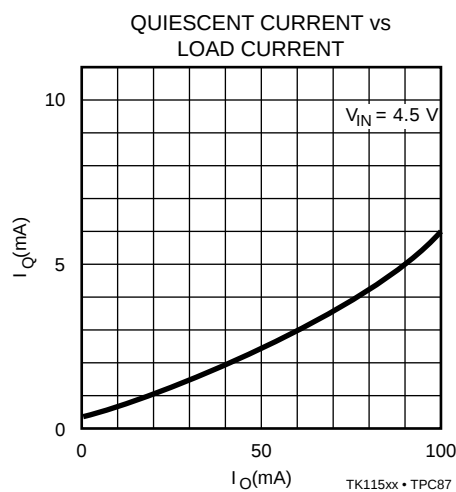
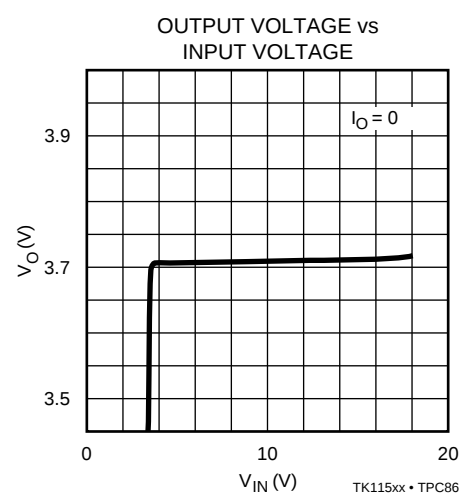
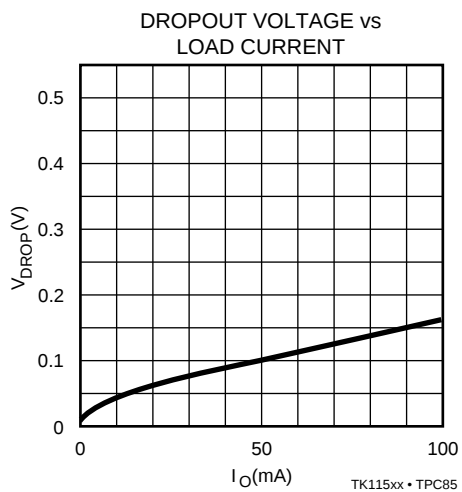
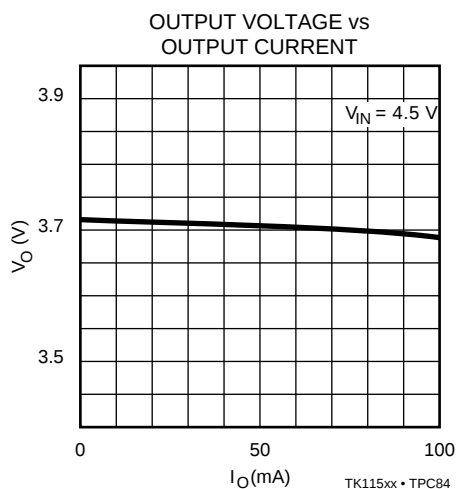


TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

TK11535 (CONT.)

 $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

TK11537

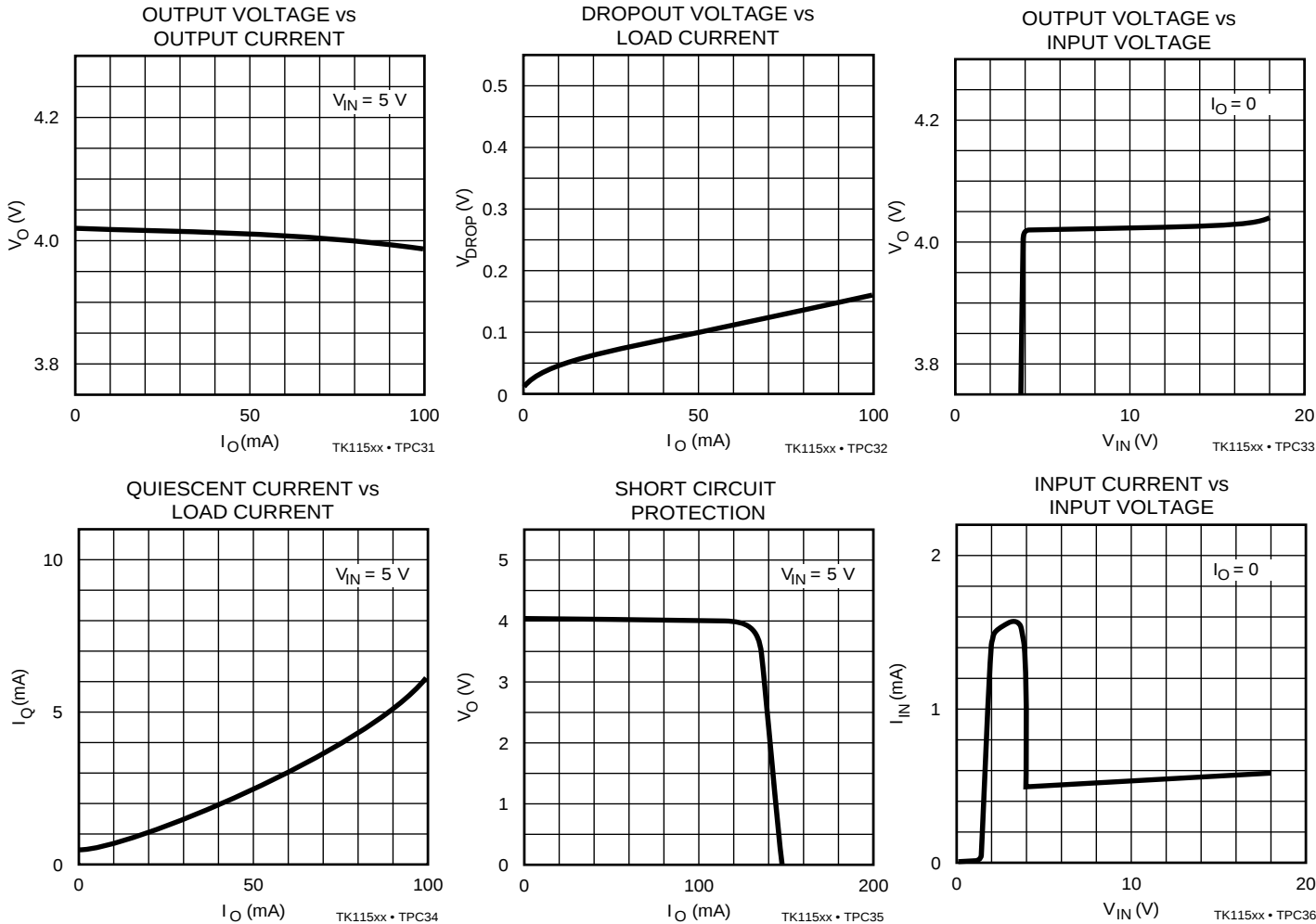


TK115xx

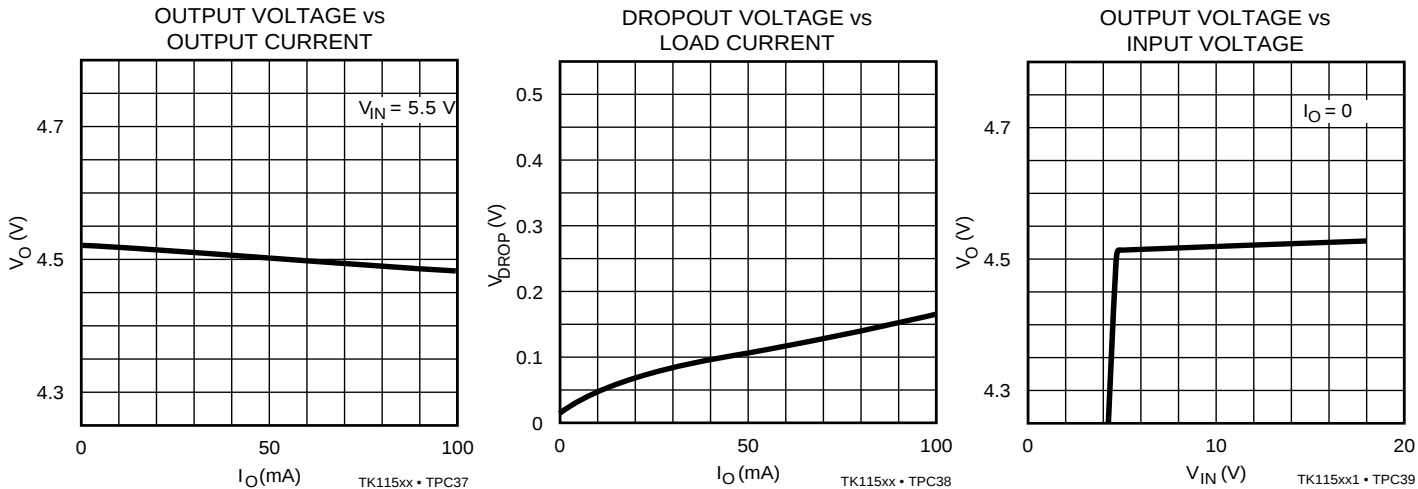
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

TK11540

$T_A = 25^\circ\text{C}$ unless otherwise specified

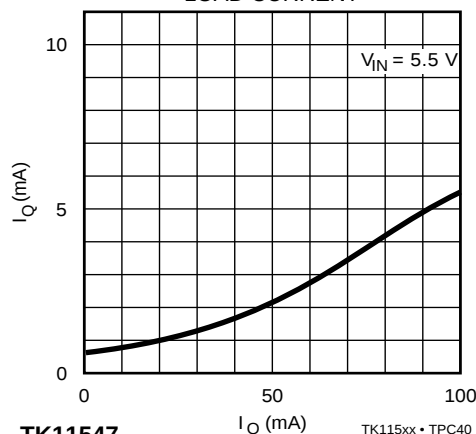


TK11545



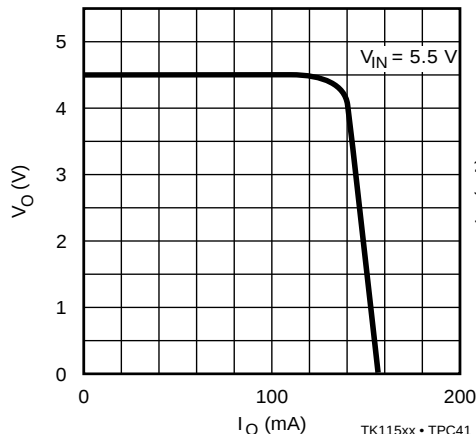
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

TK11545 (CONT.)

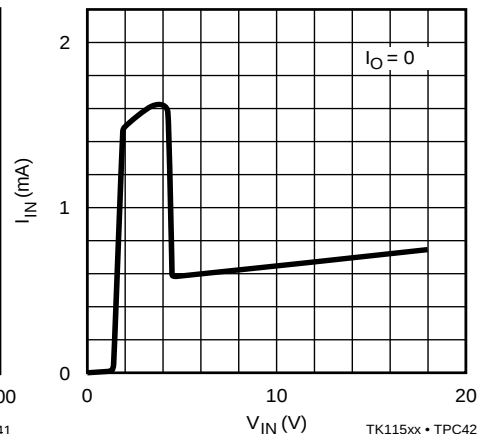
 $T_A = 25^\circ\text{C}$ unless otherwise specifiedQUIESCENT CURRENT vs
LOAD CURRENT

TK11547

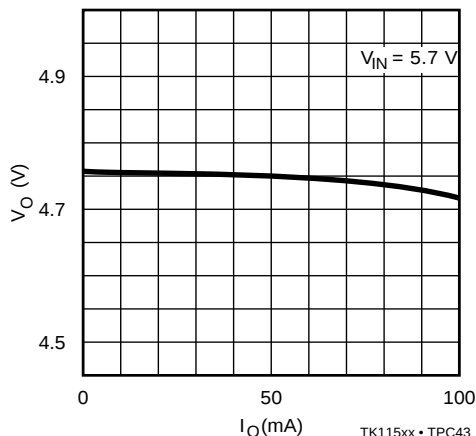
TK115xx • TPC40

SHORT CIRCUIT
PROTECTION

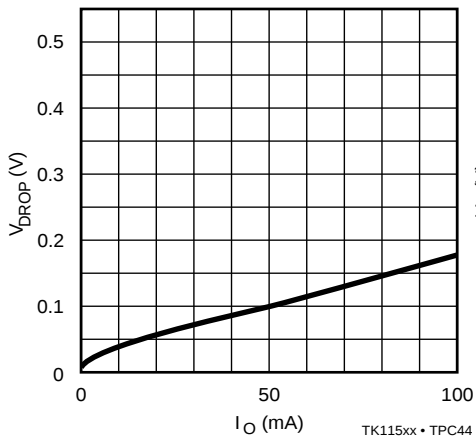
TK115xx • TPC41

INPUT CURRENT vs
INPUT VOLTAGE

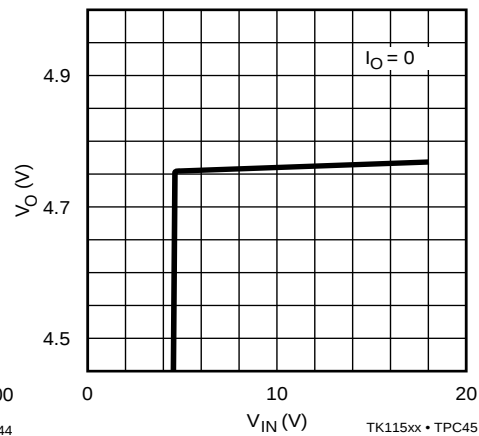
TK115xx • TPC42

OUTPUT VOLTAGE vs
OUTPUT CURRENT

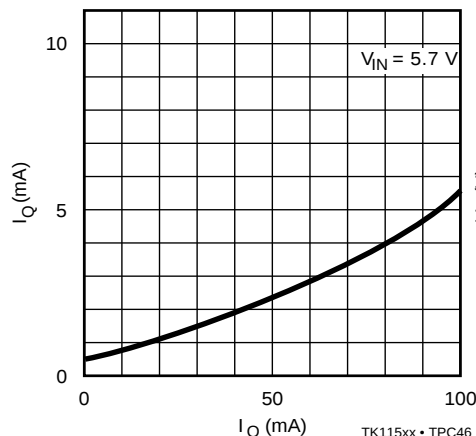
TK115xx • TPC43

DROPOUT VOLTAGE vs
LOAD CURRENT

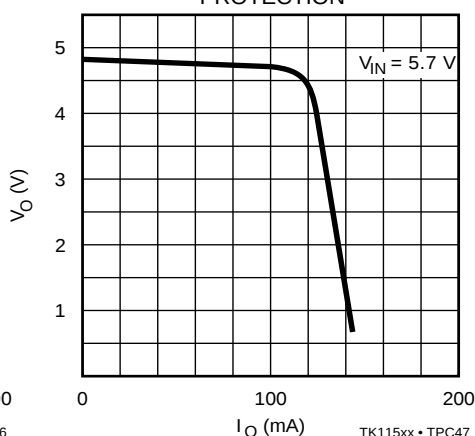
TK115xx • TPC44

OUTPUT VOLTAGE vs
INPUT VOLTAGE

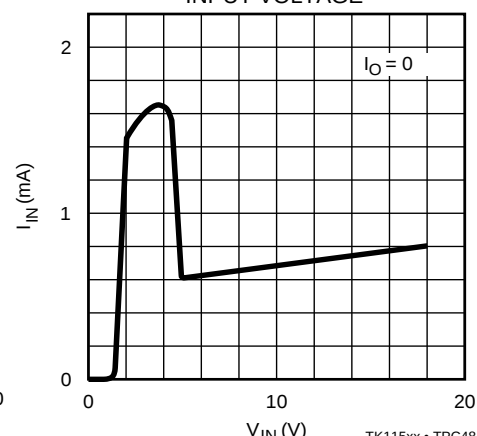
TK115xx • TPC45

QUIESCENT CURRENT vs
LOAD CURRENT

TK115xx • TPC46

SHORT CIRCUIT
PROTECTION

TK115xx • TPC47

INPUT CURRENT vs
INPUT VOLTAGE

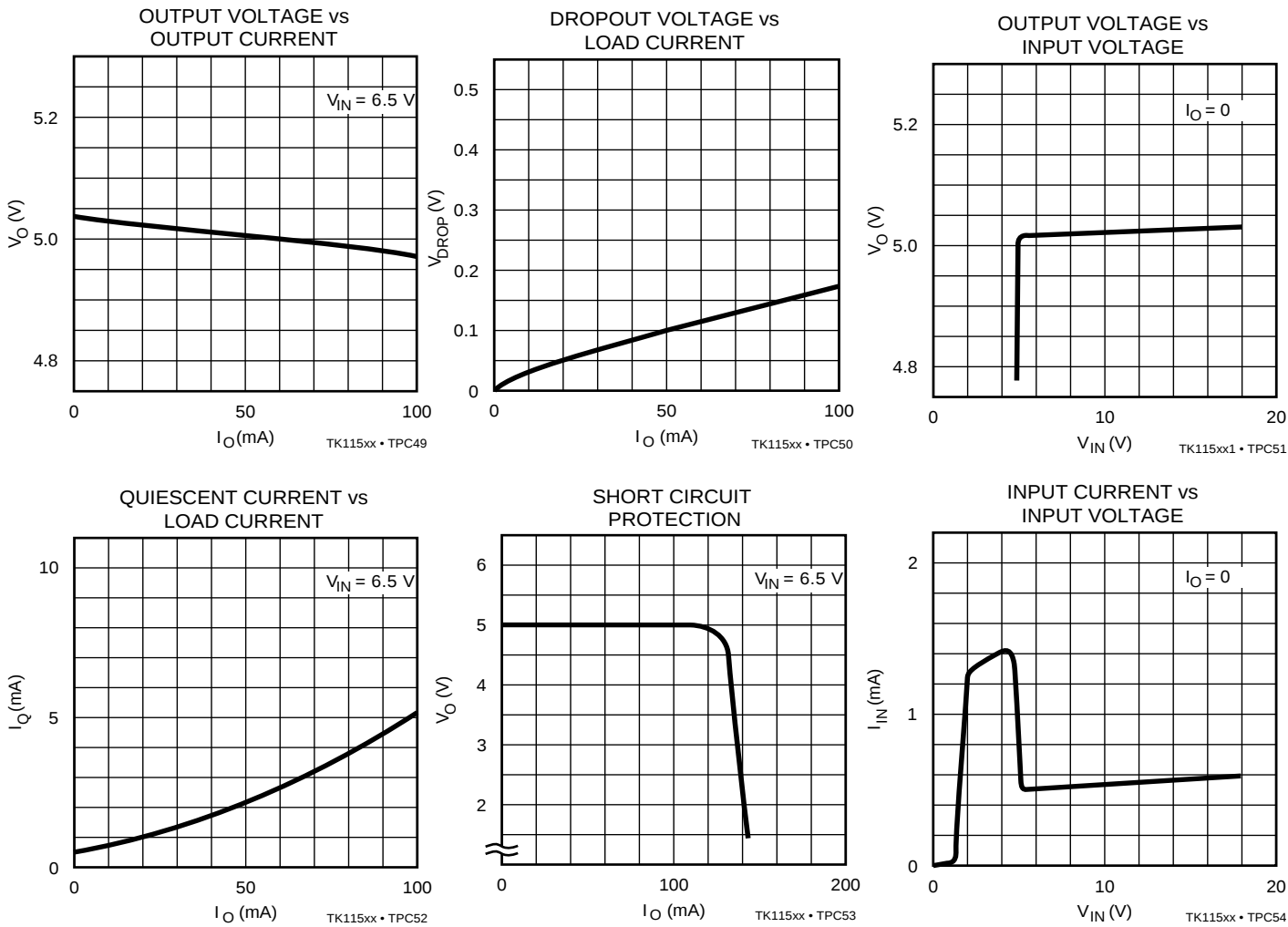
TK115xx • TPC48

TK115xx

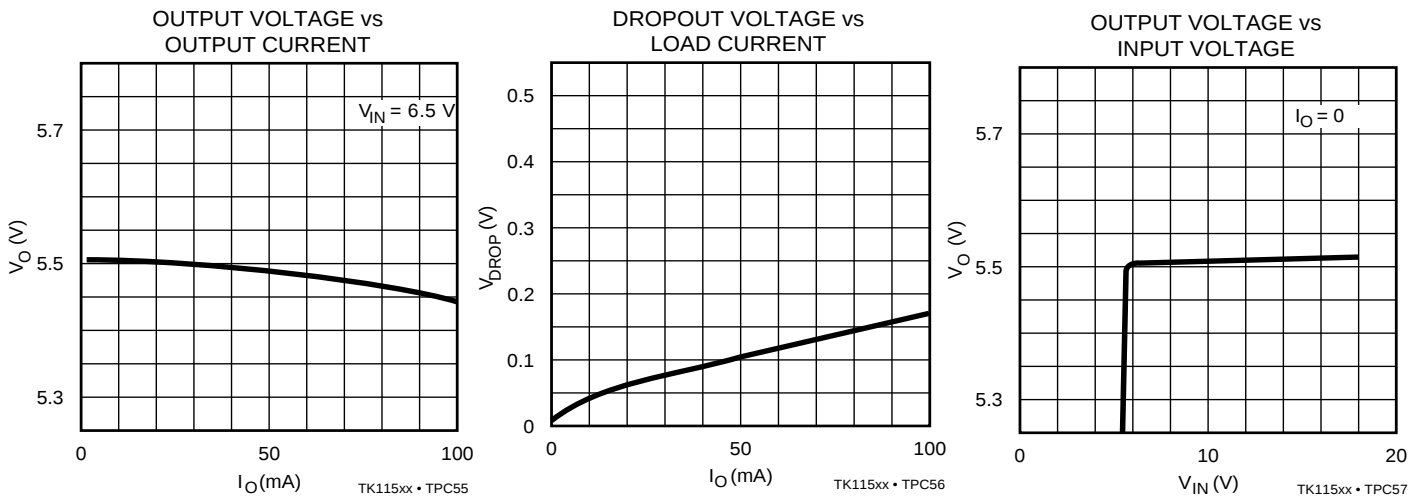
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

TK11550

T_A = 25 °C unless otherwise specified

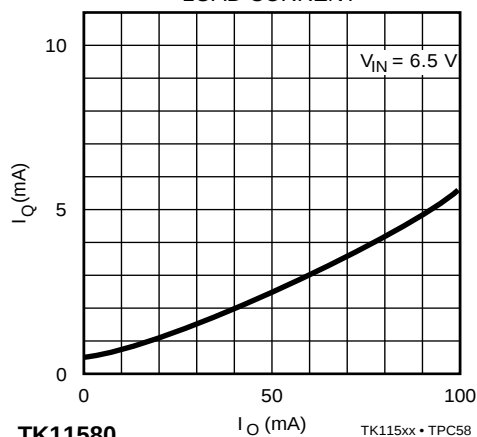


TK11555



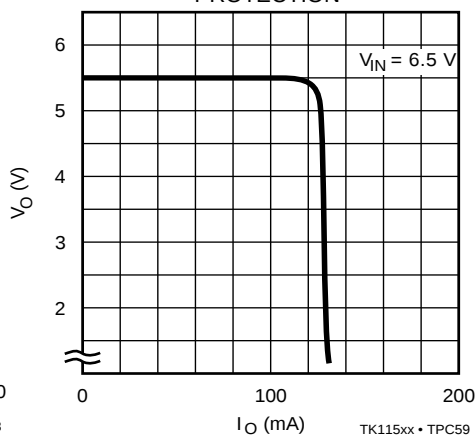
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

TK11555 (CONT.)

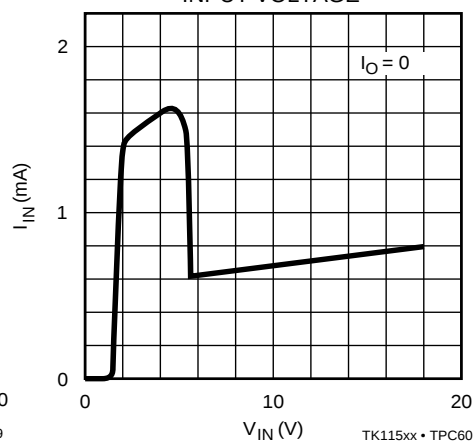
 $T_A = 25^\circ\text{C}$ unless otherwise specifiedQUIESCENT CURRENT vs
LOAD CURRENT

TK11580

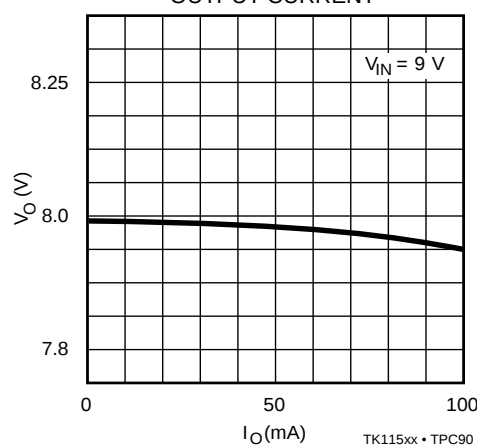
TK115xx • TPC58

SHORT CIRCUIT
PROTECTION

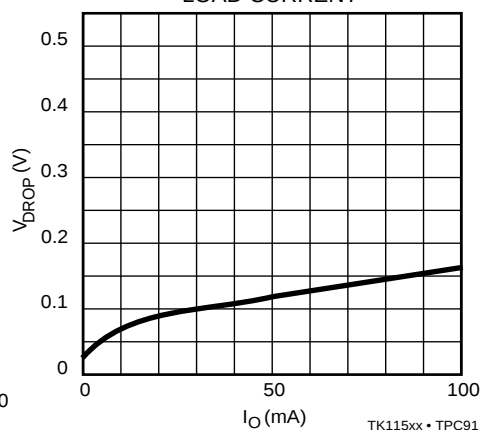
TK115xx • TPC59

INPUT CURRENT vs
INPUT VOLTAGE

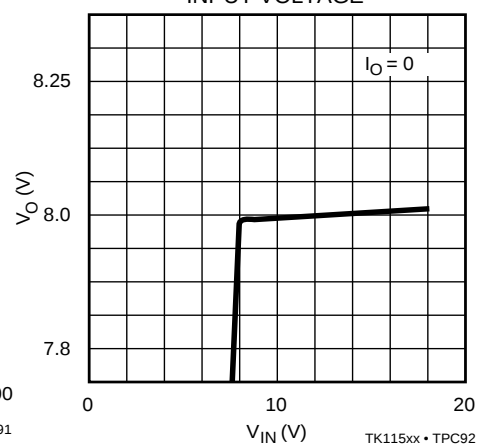
TK115xx • TPC60

OUTPUT VOLTAGE vs
OUTPUT CURRENT

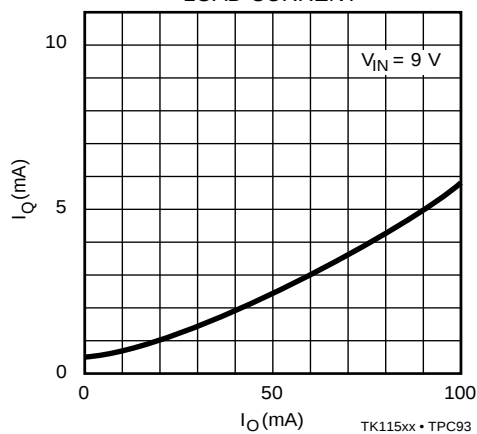
TK115xx • TPC90

DROPOUT VOLTAGE vs
LOAD CURRENT

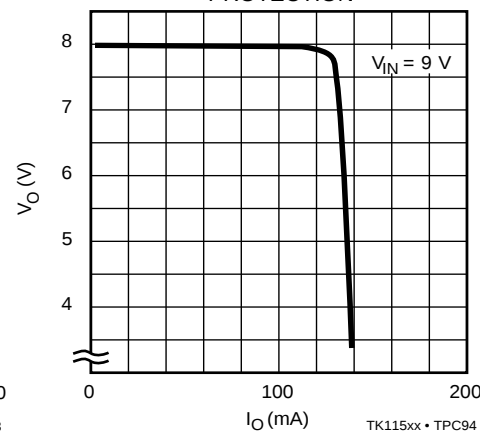
TK115xx • TPC91

OUTPUT VOLTAGE vs
INPUT VOLTAGE

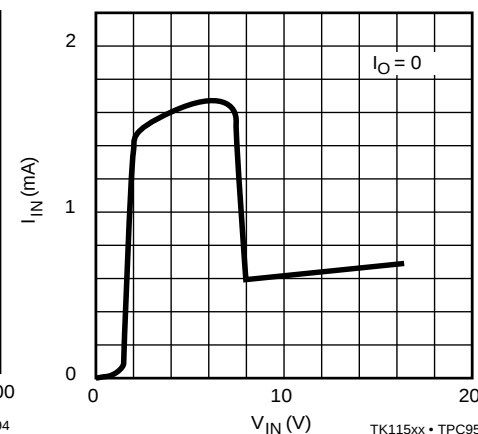
TK115xx • TPC92

QUIESCENT CURRENT vs
LOAD CURRENT

TK115xx • TPC93

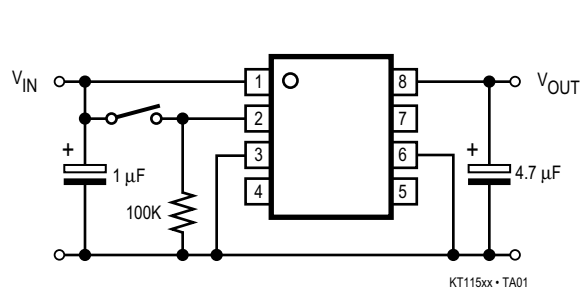
SHORT CIRCUIT
PROTECTION

TK115xx • TPC94

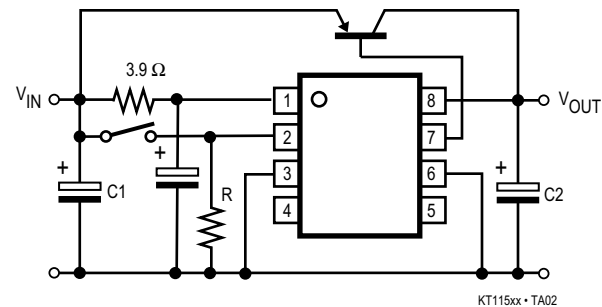
INPUT CURRENT vs
INPUT VOLTAGE

TK115xx • TPC95

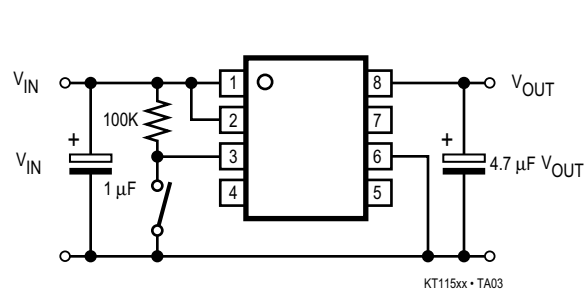
TYPICAL APPLICATIONS



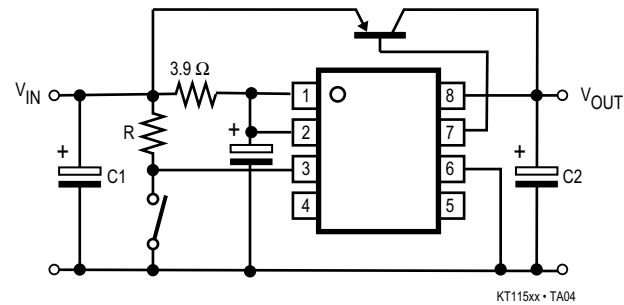
ACTIVE HIGH CONTROL



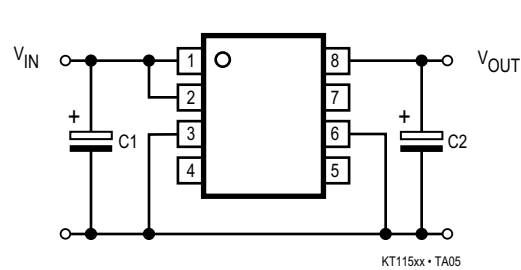
ACTIVE HIGH CONTROL WITH CURRENT BOOST



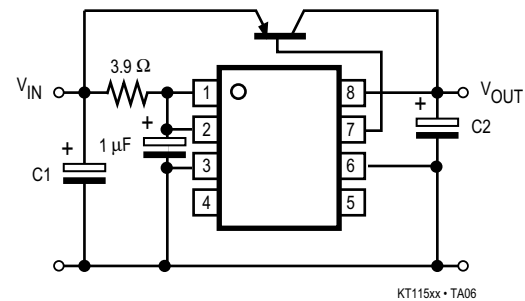
ACTIVE LOW CONTROL



ACTIVE LOW CONTROL WITH CURRENT BOOST

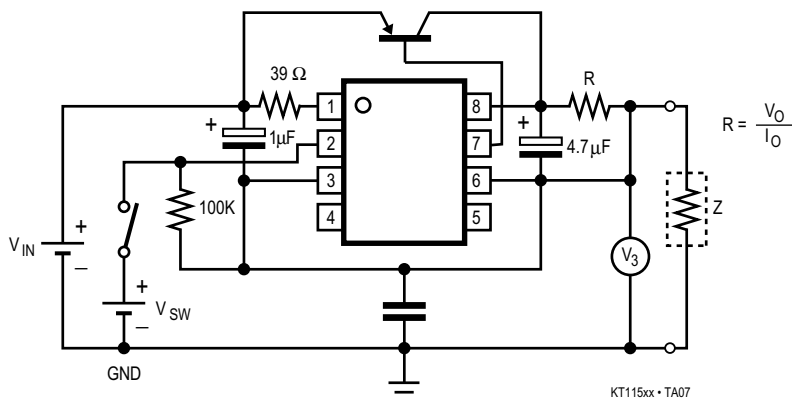


NO SWITCH CONTROL

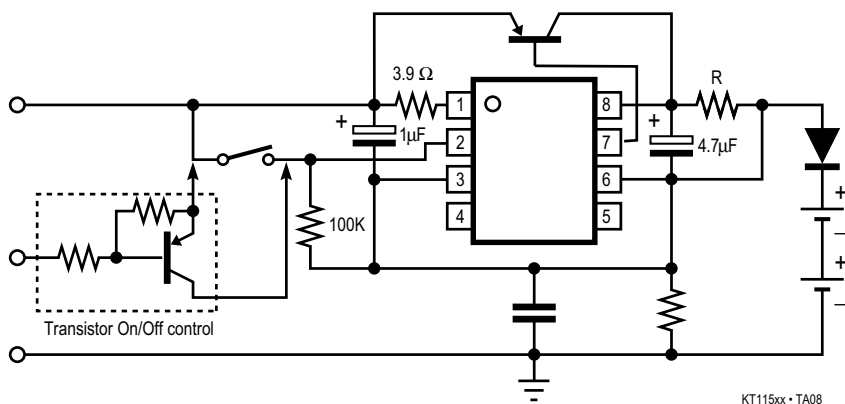


NO SWITCH CONTROL WITH CURRENT BOOST

TYPICAL APPLICATIONS (CONT.)



CURRENT MODE REGULATOR WITH ON/OFF CONTROL AND CURRENT BOOST



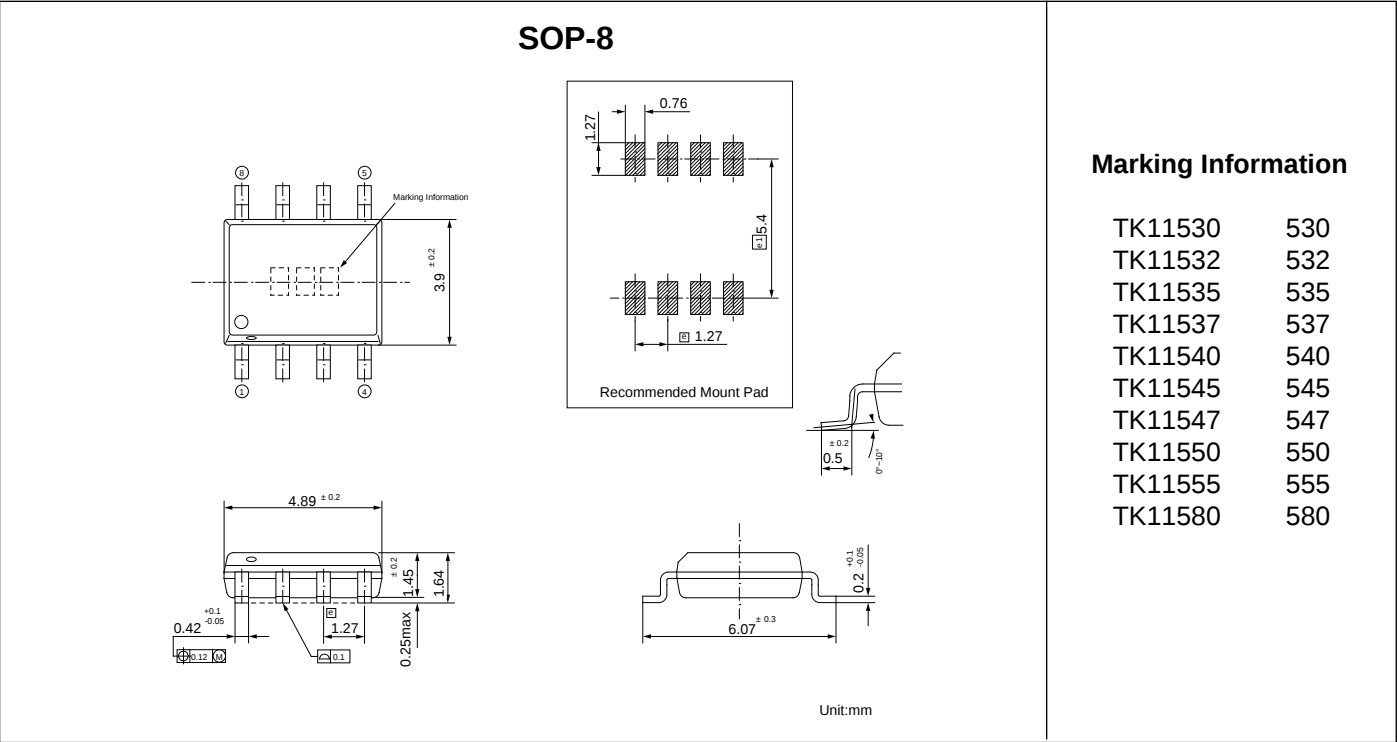
BATTERY CHARGER WITH ON/OFF CONTROL AND CURRENT BOOST

APPLICATION HINTS

Maximize copper foil area connecting to all IC pins for optimum performance. Place input and output bypass capacitors close to the GND pin. For best transient behavior and lowest output impedance, use as large 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 μ F for Tantalum electrolytic or 4.7 μ F for Aluminum electrolytic at $T_A = 25^\circ\text{C}$.

PACKAGE OUTLINE



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