



KD1083

7.5A LOW DROP POSITIVE VOLTAGE REGULATOR ADJUSTABLE AND FIXED

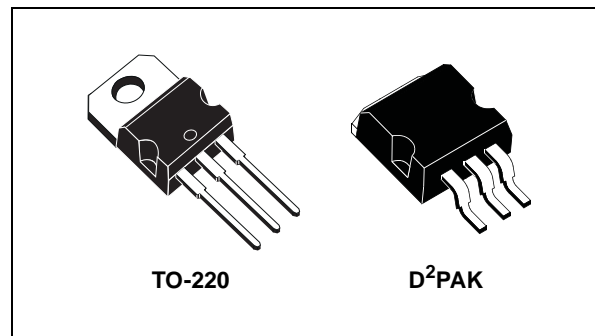
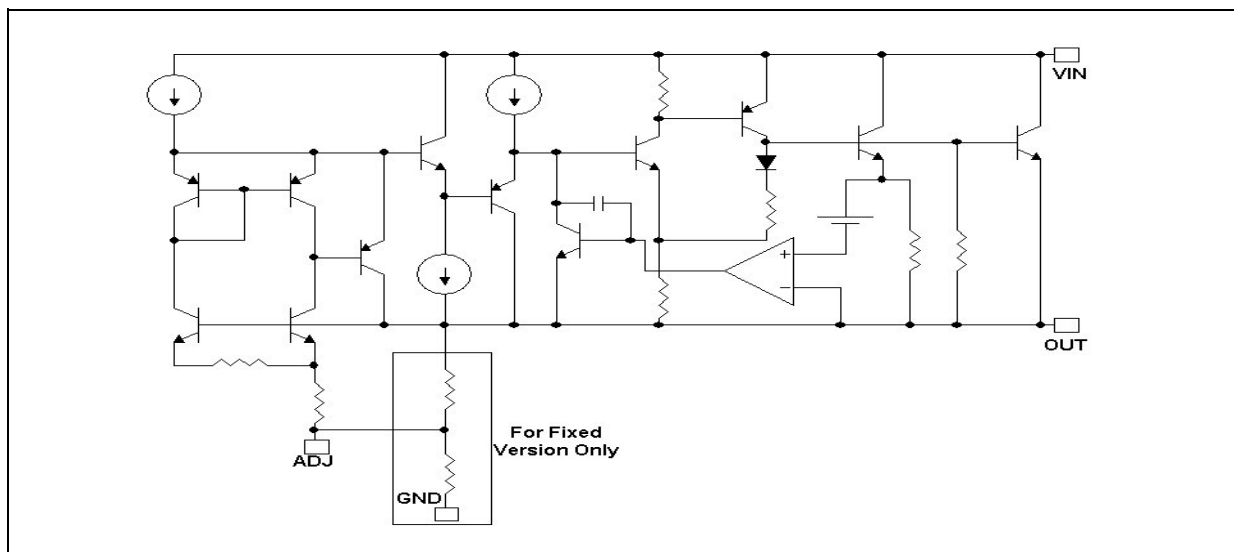
PRELIMINARY DATA

- THREE TERMINAL ADJUSTABLE OR FIXED OUTPUT VOLTAGE 1.5V, 1.8V, 2.5V, 3.0, 3.3V
- OUTPUT CURRENT UP TO 7.5A
- 1.4V MAX DROPOUT VOLTAGE AT FULL LOAD
- LINE REGULATION: MAX 0.2% OVER FULL TEMPERATURE RANGE
- LOAD REGULATION: MAX 0.5% OVER FULL TEMPERATURE RANGE
- OUTPUT CURRENT LIMIT
- THERMAL SHUTDOWN PROTECTION WITH HYSTERESIS
- WIDE OPERATING TEMPERATURE RANGE -40°C TO 125°C
- PINOUT COMPATIBILITY WITH STANDARD ADJUSTABLE VREG

DESCRIPTION

The KD1083 is a low drop linear voltage regulator, proposed both in adjustable and fixed version and designed for use in applications requiring output currents up to 7.5A. Dropout voltage is guaranteed not to exceed 1.4V at maximum output current while it decreases at lighter loads. The KD1083 also features an on-chip output current limit function and a thermal shutdown protection with hysteresis, preventing from excessive power dissipation in case of

SCHEMATIC DIAGRAM



insufficient heatsinking. The KD1083 is fully pin to pin compatible with the older 3-terminal adjustable regulators, but it has better performances in terms of drop and output voltage precision.

On chip trimming allows the regulator to reach a very tight output voltage tolerance, within $\pm 2\%$ at 25°C and 2% over the full temperature range. Unlike voltage regulators using a PNP transistor as series pass element in which a considerable fraction of the output current is wasted as quiescent current, the LD1083 quiescent current flows almost entirely into the load, improving the efficiency.

Only a 10 μ F minimum capacitor is required for output stability.

KD1083

ABSOLUTE MAXIMUM RATINGS

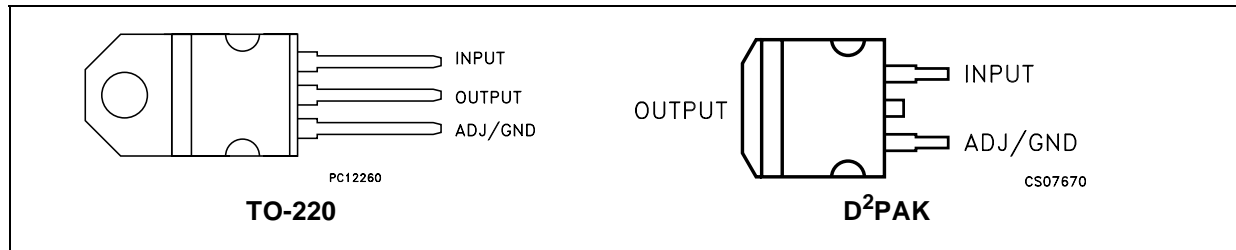
Symbol	Parameter	Value	Unit
V_{IN}	DC Input to Output Voltage	from -0.3 to 10	V
I_O	Output Current	Internally Limited	A
P_D	Power Dissipation	Internally Limited	W
T_{stg}	Storage Temperature Range	-55 to +150	°C
T_{op}	Operating Junction Temperature Range	-40 to +125	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

THERMAL DATA

Symbol	Parameter	TO-220	D ² PAK	Unit
$R_{thj-case}$	Thermal Resistance Junction-case	3	3	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient	50	62.5	°C/W

CONNECTION DIAGRAM (top view)

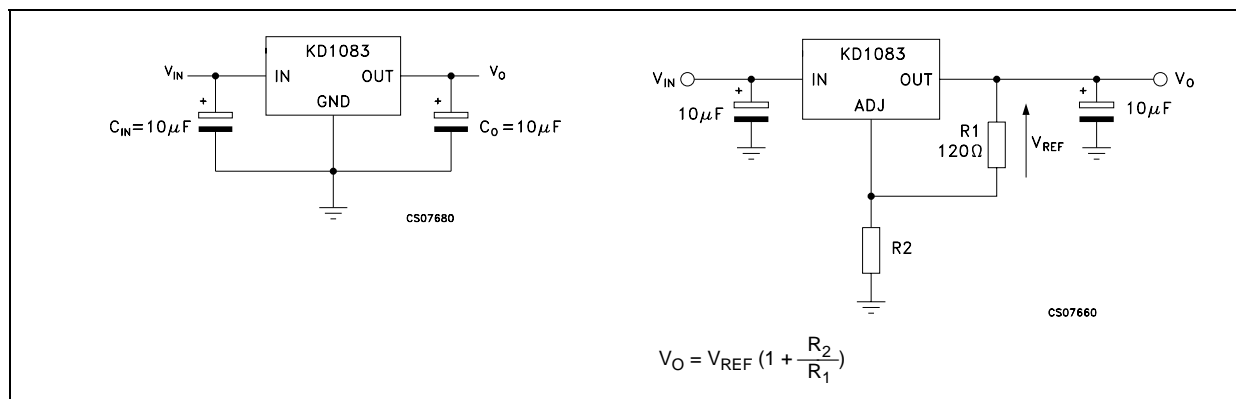


ORDERING CODES

TO-220	D ² PAK(*)	OUTPUT VOLTAGE
KD1083V15	KD1083D2T15	1.5V
KD1083V18	KD1083D2T18	1.8V
KD1083V25	KD1083D2T25	2.5V
KD1083V30	KD1083D2T30	3.0V
KD1083V33	KD1083D2T33	3.3V
KD1083V	KD1083D2T	Adjustable

(*) Available in Tape & Reel with the suffix "R" for fixed version and "-R" for adjustable version.

TYPICAL APPLICATION CIRCUITS



ELECTRICAL CHARACTERISTICS OF KD1083 ($V_{IN}=3V$, $C_I = C_O = 10\mu F$, $T_j = -40$ to $125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{REF}	Reference Voltage	$I_O=10mA$, $(V_{IN}-V_O) = 3V$, $T_j = 25^\circ C$	1.237	1.25	1.262	V
		$I_O = 0.01$ to $7.5A$, $(V_{IN}-V_O) = 1.5$ to $5.75V$ (note1)	1.225	1.25	1.275	V
ΔV_{REF}	Line Regulation	$I_O=10mA$, $(V_{IN}-V_O) = 1.5$ to $5.75V$		0.015	0.2	%
ΔV_{REF}	Load Regulation	$(V_{IN}-V_O)=3V$, $I_O = 10mA$ to $7.5A$		0.3	0.5	%
V_d	Dropout Voltage	$\Delta V_O=2\%$, $I_O=7.5A$		1.05	1.4	V
I_{sc}	Short Circuit Current	$(V_{IN}-V_O) = 1.5$ to $5.75V$		8.5		A
$I_{O(min)}$	Minimum Load Current	$(V_{IN}-V_O) = 1.5$ to $5.75V$		5	10	mA
I_{ADJ}	Adjust Pin Current	$I_O = 10mA$ to $7.5A$		40	80	μA
ΔI_{ADJ}	Adjust Pin Current Change	$I_O = 10mA$ to $7.5A$, $(V_{IN}-V_O) = 1.5$ to $5.75V$		0.2	5	μA
SVR	Supply Voltage Rejection	$f = 120$ Hz, $C_O = 25 \mu F$, $I_O = 7.5A$, $(V_{IN}-V_O)=3V$, $V_{PP}=1V$	60	75		dB
eN	RMS Output Noise Voltage (% of V_O)	$T_A = 25^\circ C$, $f = 10Hz$ to $10kHz$, $I_O=10mA$, $(V_{IN}-V_O) = 3V$		0.003		%
T_{SHDN}	Thermal Shutdown Threshold			175		$^\circ C$
T_{HYST}	Thermal Shutdown Hysteresis			5		$^\circ C$

NOTE 1: See short-circuit current curve for available output current at fixed dropout.

ELECTRICAL CHARACTERISTICS OF KD1083#15 ($V_{IN}=3.25V$, $C_I = C_O = 10\mu F$, $T_j = -40$ to $125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$I_O=10mA$, $(V_{IN}-V_O)=3V$, $T_j = 25^\circ C$	1.485	1.5	1.515	V
		$I_O = 0$ to $7.5A$, $(V_{IN}-V_O) = 1.5$ to $5.5V$ (note1)	1.47	1.5	1.53	V
ΔV_O	Line Regulation	$I_O=10mA$, $(V_{IN}-V_O) = 1.5$ to $5.5V$		0.015	0.2	%
ΔV_O	Load Regulation	$(V_{IN}-V_O)=3V$, $I_O = 0$ to $7.5A$		0.3	0.5	%
V_d	Dropout Voltage	$\Delta V_O=2\%$, $I_O=7.5A$		1.05	1.4	V
I_{sc}	Short Circuit Current	$(V_{IN}-V_O) = 1.5$ to $5.5V$		8.5		A
I_d	Quiescent Current	$(V_{IN}-V_O) = 1.5$ to $5.5V$, $I_O=0A$		5	10	mA
SVR	Supply Voltage Rejection	$f = 120$ Hz, $C_O = 25 \mu F$, $I_O = 7.5A$, $(V_{IN}-V_O) = 3V$, $V_{PP}=1V$	58.6	73.4		dB
eN	RMS Output Noise Voltage (% of V_O)	$T_A = 25^\circ C$, $f = 10Hz$ to $10kHz$, $I_O=10mA$, $(V_{IN}-V_O)=3V$		0.003		%
T_{SHDN}	Thermal Shutdown Threshold			175		$^\circ C$
T_{HYST}	Thermal Shutdown Hysteresis			5		$^\circ C$

NOTE 1: See short-circuit current curve for available output current at fixed dropout.

ELECTRICAL CHARACTERISTICS OF KD1083#18($V_{IN}=3.5V$, $C_I = C_O = 10\mu F$, $T_j = -40$ to $125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$I_O=10mA$, $(V_{IN}-V_O)=3V$, $T_j = 25^\circ C$	1.782	1.8	1.818	V
		$I_O = 0$ to $7.5A$, $(V_{IN}-V_O) = 1.5$ to $5.2V$ (note1)	1.764	1.8	1.836	V
ΔV_O	Line Regulation	$I_O=10mA$, $(V_{IN}-V_O) = 1.5$ to $5.2V$		0.015	0.2	%
ΔV_O	Load Regulation	$(V_{IN}-V_O)=3V$, $I_O = 0$ to $7.5A$		0.3	0.5	%
V_d	Dropout Voltage	$\Delta V_O=2\%$, $I_O=7.5A$		1.05	1.4	V
I_{sc}	Short Circuit Current	$(V_{IN}-V_O) = 1.5$ to $5.2V$		8.5		A
I_d	Quiescent Current	$(V_{IN}-V_O) = 1.5$ to $5.2V$, $I_O=0A$		5	10	mA
SVR	Supply Voltage Rejection	$f = 120$ Hz, $C_O = 25 \mu F$, $I_O = 7.5A$, $(V_{IN}-V_O) = 3V$, $V_{PP}=1V$	57	71.8		dB
eN	RMS Output Noise Voltage (% of V_O)	$T_A = 25^\circ C$, $f = 10Hz$ to $10kHz$, $I_O=10mA$, $(V_{IN}-V_O)=3V$		0.003		%
T_{SHDN}	Thermal Shutdown Threshold			175		$^\circ C$
T_{HYST}	Thermal Shutdown Hysteresis			5		$^\circ C$

NOTE 1: See short-circuit current curve for available output current at fixed dropout.

ELECTRICAL CHARACTERISTICS OF KD1083#25 ($V_{IN}=4.25V$, $C_I = C_O = 10\mu F$, $T_j = -40$ to $125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$I_O=10mA$, $(V_{IN}-V_O)=3V$, $T_j = 25^\circ C$	2.475	2.5	2.525	V
		$I_O = 0$ to $7.5A$, $(V_{IN}-V_O) = 1.5$ to $4.5V$ (note 1)	2.45	2.5	2.55	V
ΔV_O	Line Regulation	$I_O=10mA$, $(V_{IN}-V_O) = 1.5$ to $4.5V$		0.015	0.2	%
ΔV_O	Load Regulation	$(V_{IN}-V_O)=3V$, $I_O = 0$ to $7.5A$		0.3	0.5	%
V_d	Dropout Voltage	$\Delta V_O=2\%$, $I_O=7.5A$		1.05	1.4	V
I_{sc}	Short Circuit Current	$(V_{IN}-V_O) = 1.5$ to $4.5V$		8.5		A
I_d	Quiescent Current	$(V_{IN}-V_O) = 1.5$ to $4.5V$, $I_O=0A$		5	10	mA
SVR	Supply Voltage Rejection	$f = 120$ Hz, $C_O = 25 \mu F$, $I_O = 7.5A$, $(V_{IN}-V_O) = 3V$, $V_{PP}=1V$	54.1	68.9		dB
eN	RMS Output Noise Voltage (% of V_O)	$T_A = 25^\circ C$, $f = 10Hz$ to $10kHz$, $I_O=10mA$, $(V_{IN}-V_O)=3V$		0.003		%
T_{SHDN}	Thermal Shutdown Threshold			175		$^\circ C$
T_{HYST}	Thermal Shutdown Hysteresis			5		$^\circ C$

NOTE 1: See short-circuit current curve for available output current at fixed dropout.

ELECTRICAL CHARACTERISTICS OF KD1083#30 ($V_{IN}=4.75V$, $C_I = C_O = 10\mu F$, $T_j = -40$ to $125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$I_O=10mA$, $(V_{IN}-V_O)=3V$, $T_j = 25^\circ C$	2.97	3.0	3.03	V
		$I_O = 0$ to $7.5A$, $(V_{IN}-V_O) = 1.5$ to $4V$ (note 1)	2.94	3	3.06	V
ΔV_O	Line Regulation	$I_O=10mA$, $(V_{IN}-V_O) = 1.5$ to $4V$		0.015	0.2	%
ΔV_O	Load Regulation	$(V_{IN}-V_O)=3V$, $I_O = 0$ to $7.5A$		0.3	0.5	%
V_d	Dropout Voltage	$\Delta V_O=2\%$, $I_O=7.5A$		1.05	1.4	V
I_{sc}	Short Circuit Current	$(V_{IN}-V_O) = 1.5$ to $4V$		8.5		A
I_d	Quiescent Current	$(V_{IN}-V_O) = 1.5$ to $4V$, $I_O=0A$		5	10	mA
SVR	Supply Voltage Rejection	$f = 120$ Hz, $C_O = 25 \mu F$, $I_O = 7.5A$, $(V_{IN}-V_O) = 3V$, $V_{PP}=1V$	52.5	67.3		dB
eN	RMS Output Noise Voltage (% of V_O)	$T_A = 25^\circ C$, $f=10Hz$ to $10kHz$, $I_O=10mA$, $(V_{IN}-V_O)=3V$		0.003		%
T_{SHDN}	Thermal Shutdown Threshold			175		$^\circ C$
T_{HYST}	Thermal Shutdown Hysteresis			5		$^\circ C$

NOTE 1: See short-circuit current curve for available output current at fixed dropout.

ELECTRICAL CHARACTERISTICS OF KD1083#33 ($V_{IN}=5.0V$, $C_I = C_O = 10\mu F$, $T_j = -40$ to $125^\circ C$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$I_O=10mA$, $(V_{IN}-V_O)=3V$, $T_j = 25^\circ C$	3.267	3.3	3.333	V
		$I_O = 0$ to $7.5A$, $(V_{IN}-V_O) = 1.5$ to $3.7V$ (note 1)	3.234	3.3	3.366	V
ΔV_O	Line Regulation	$I_O=10mA$, $(V_{IN}-V_O) = 1.5$ to $3.7V$		0.015	0.2	%
ΔV_O	Load Regulation	$(V_{IN}-V_O)=3V$, $I_O = 0$ to $7.5A$		0.3	0.5	%
V_d	Dropout Voltage	$\Delta V_O=2\%$, $I_O=7.5A$		1.05	1.4	V
I_{sc}	Short Circuit Current	$(V_{IN}-V_O) = 1.5$ to $3.7V$		8.5		A
I_d	Quiescent Current	$(V_{IN}-V_O) = 1.5$ to $3.7V$, $I_O=0A$		5	10	mA
SVR	Supply Voltage Rejection	$f = 120$ Hz, $C_O = 25 \mu F$, $I_O = 7.5A$, $(V_{IN}-V_O) = 3V$, $V_{PP}=1V$	51.7	66.5		dB
eN	RMS Output Noise Voltage (% of V_O)	$T_A = 25^\circ C$, $f=10Hz$ to $10kHz$, $I_O=10mA$, $(V_{IN}-V_O)=3V$		0.003		%
T_{SHDN}	Thermal Shutdown Threshold			175		$^\circ C$
T_{HYST}	Thermal Shutdown Hysteresis			5		$^\circ C$

NOTE 1: See short-circuit current curve for available output current at fixed dropout.

TYPICAL CHARACTERISTICS ($C_I=C_O=10\mu\text{F}$ (tantalum), unless otherwise specified)

Figure 1 : Reference Voltage vs Temperature

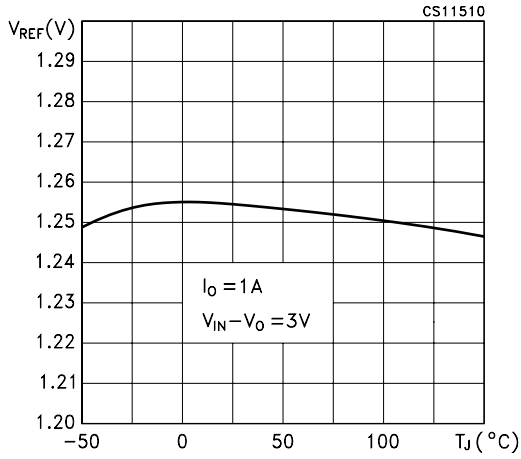


Figure 2 : Reference Voltage vs Temperature

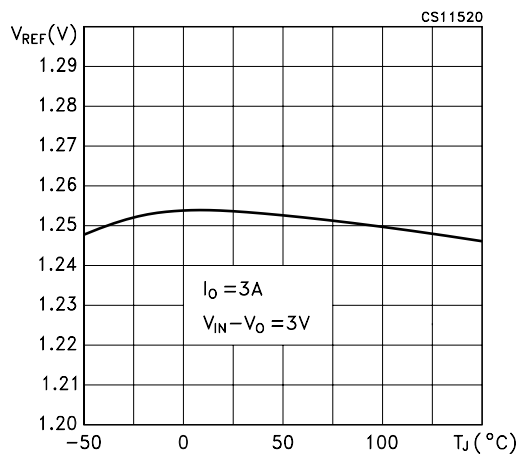


Figure 3 : Reference Voltage vs Temperature

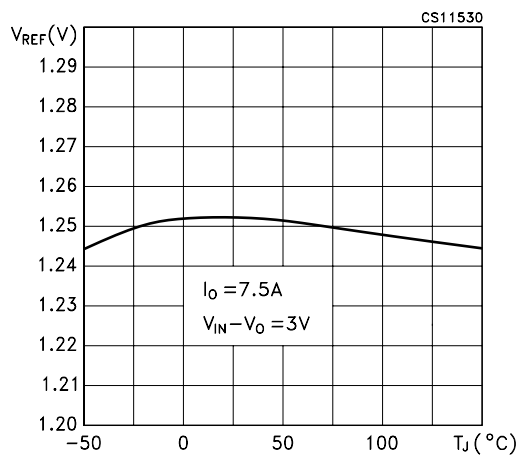


Figure 4 : Line Regulation vs Temperature

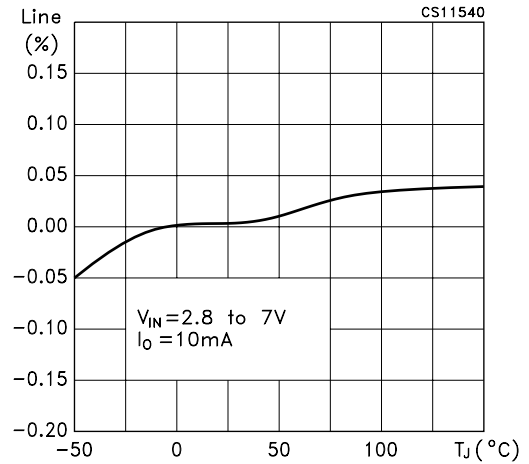


Figure 5 : Load Regulation vs Temperature

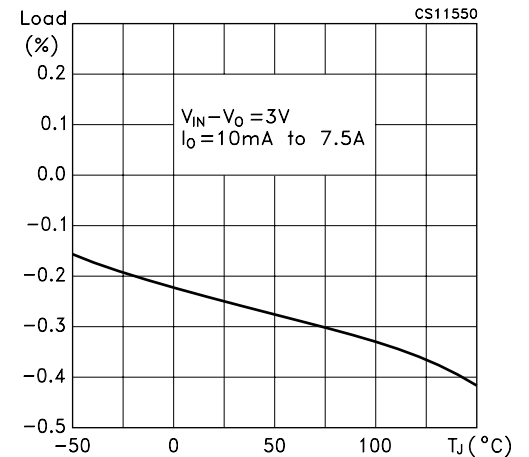


Figure 6 : Dropout Voltage vs Temperature

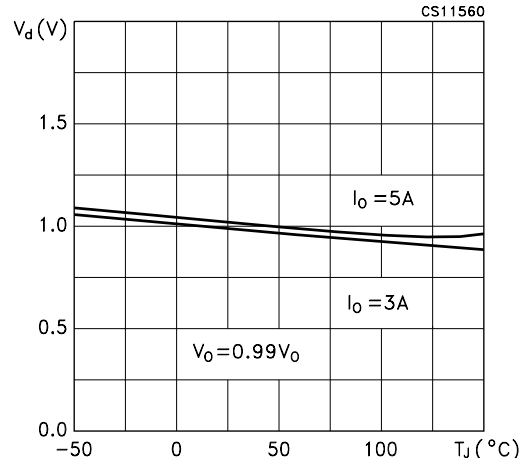


Figure 7 : Dropout Voltage vs Temperature

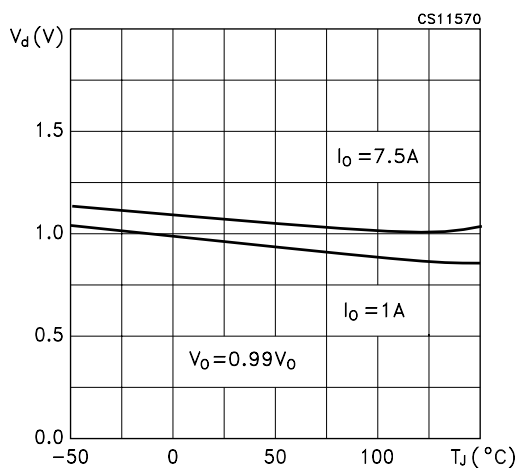


Figure 8 : Adjust Pin Current vs Temperature

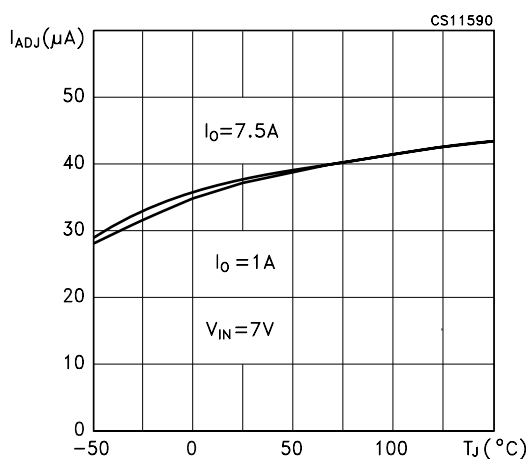


Figure 9 : Quiescent Current vs Temperature

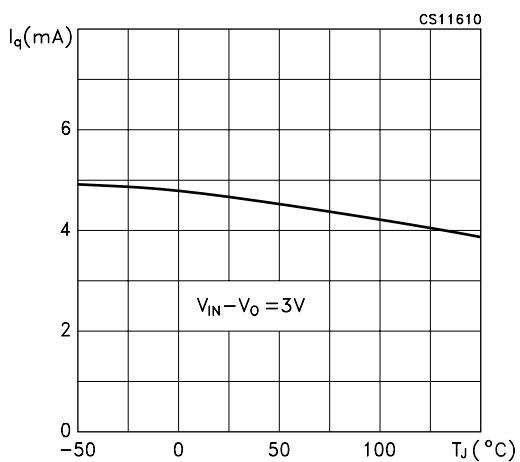


Figure 10 : Minimum Load Current vs Temperature

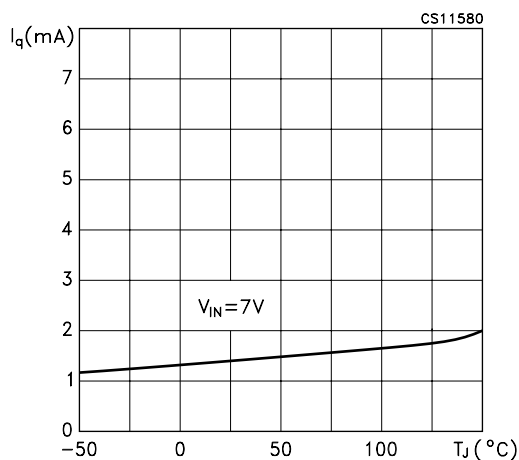


Figure 11 : Dropout Voltage vs Output Current

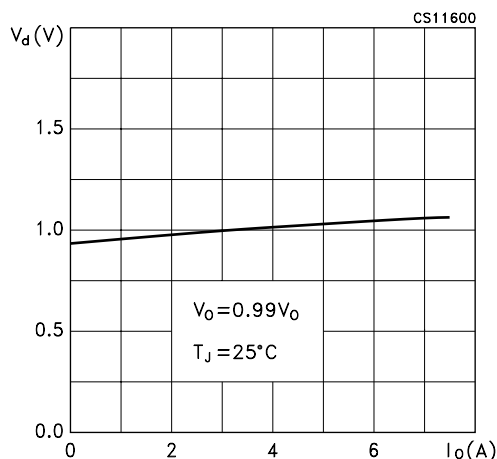


Figure 12 : Supply Voltage Rejection vs Output Current

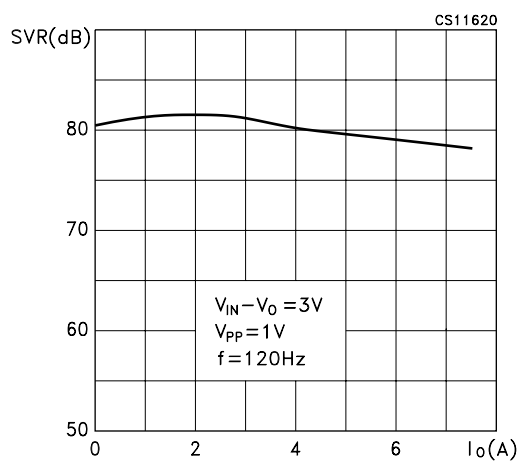


Figure 13 : Short Circuit Current vs Dropout Voltage

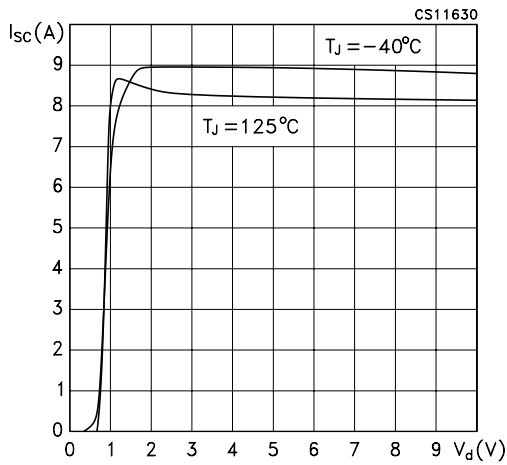


Figure 14 : Supply Voltage Rejection vs Temperature

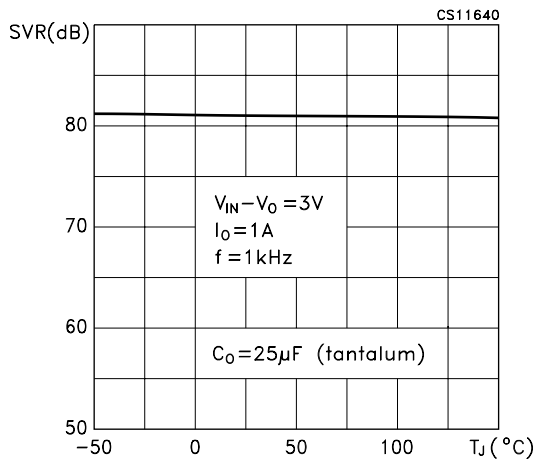


Figure 15 : Line Transient

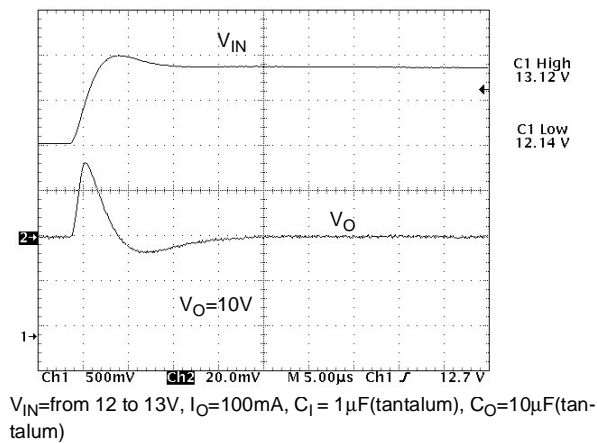


Figure 16 : Line Transient

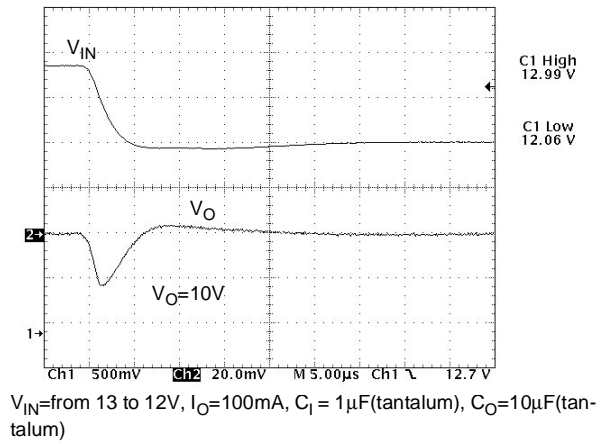


Figure 17 : Load Transient

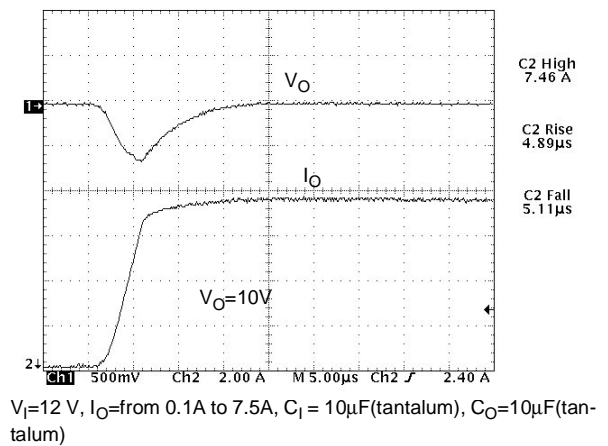
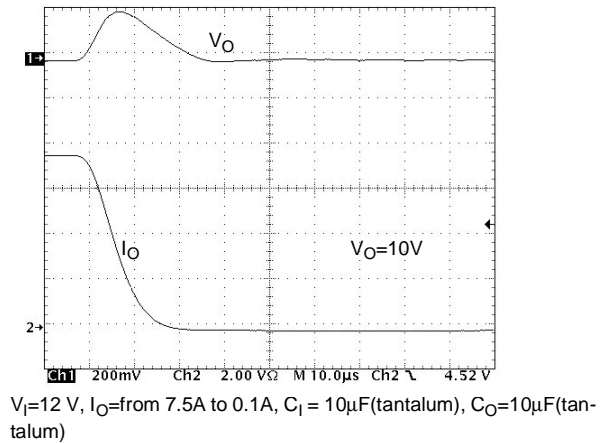
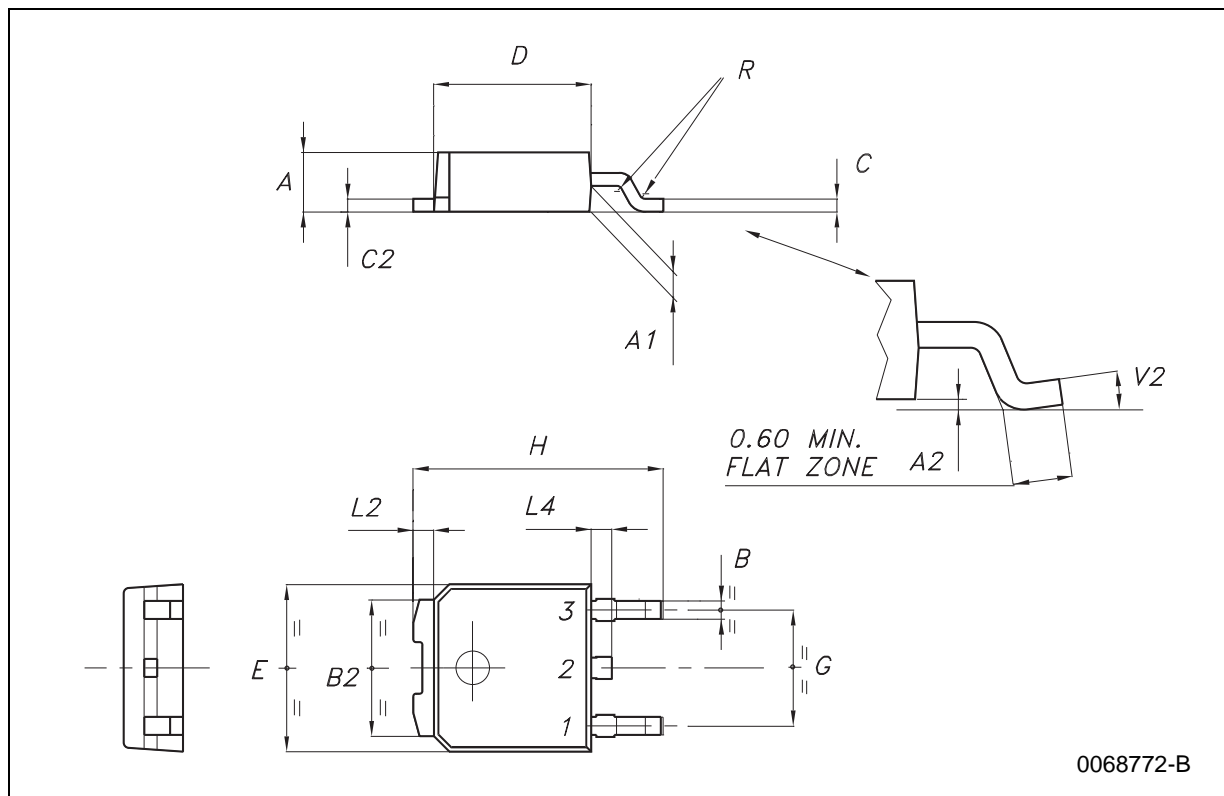


Figure 18 : Load Transient



DPAK MECHANICAL DATA

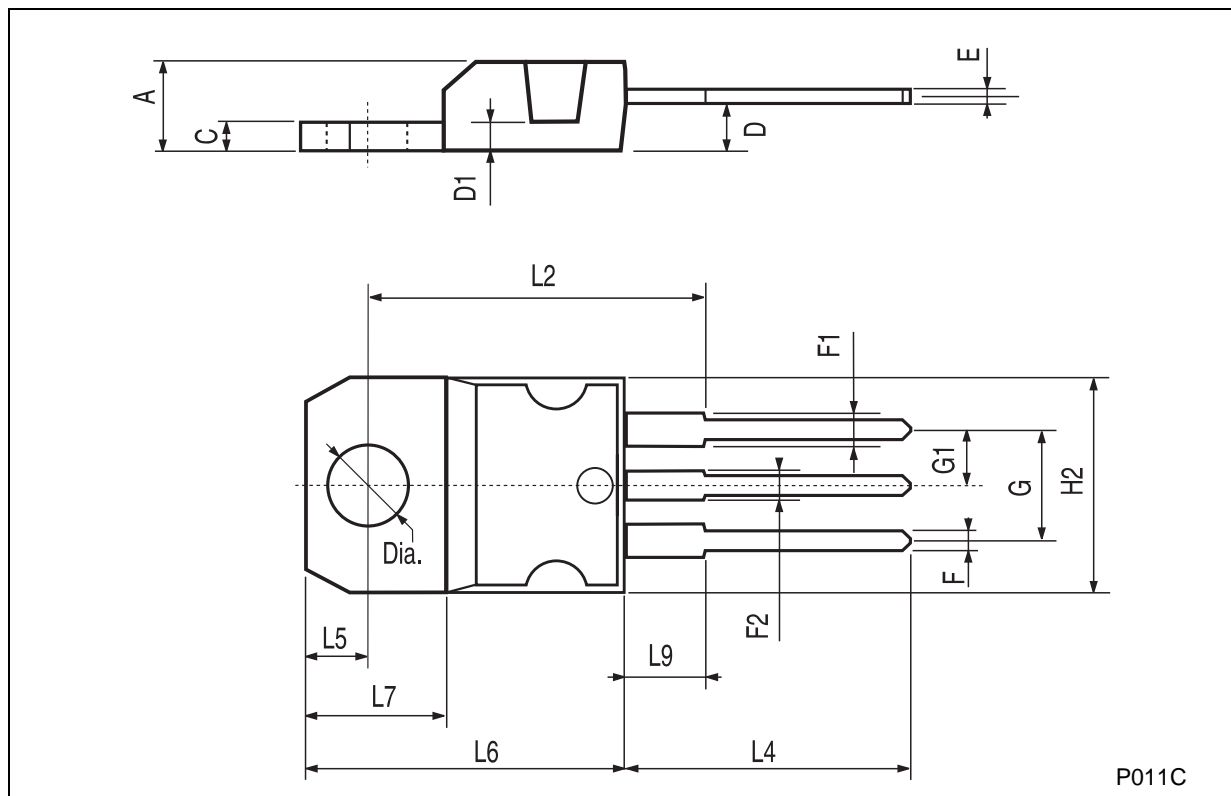
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L2		0.8			0.031	
L4	0.6		1	0.023		0.039



0068772-B

TO-220 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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