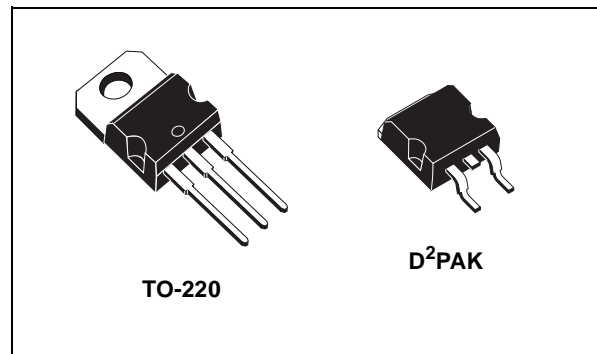


## 3A, VERY LOW DROP VOLTAGE REGULATOR

- VERY LOW DROPOUT VOLTAGE (TYP. 0.4 AT 3A)
- GUARANTEED OUTPUT CURRENT UP TO 3A
- FIXED VOLTAGE WITH  $\pm 1\%$  TOLLERANCE AT 25°C
- INTERNAL CURRENT AND THERMAL LIMIT

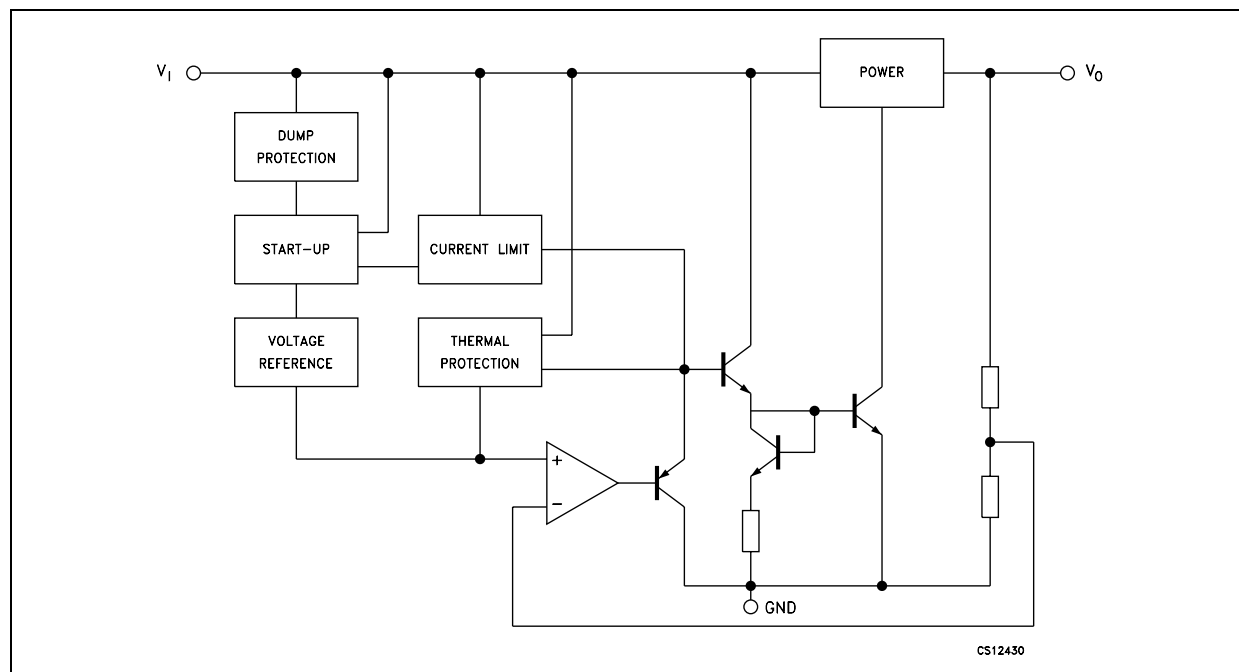
### DESCRIPTION

The LD29300 is a high current, high accuracy, low-dropout voltage regulators series. These regulators feature 400mV dropout voltages and very low ground current. Designed for high current loads, these devices also find applications in lower current, extremely low dropout-critical systems, where their tiny dropout voltage and ground current values are important attributes. Typical



application are in Power supply switching post regulation, Series power supply for monitor, Series power supply for VCRs and TVs, Computer Systems and Battery powered systems.

### SCHEMATIC DIAGRAM



## LD29300 SERIES

### ORDERING CODES

TO-220	D <sup>2</sup> PAK (*)	TOLERANCE	OUTPUT VOLTAGE
LD29300V15	LD29300D2T15	1%	1.5 V
LD29300V18	LD29300D2T18	1%	1.8 V
LD29300V25	LD29300D2T25	1%	2.5 V
LD29300V33	LD29300D2T33	1%	3.3 V
LD29300V50	LD29300D2T50	1%	5.0 V
LD29300V80	LD29300D2T80	1%	8.0 V
LD29300V90	LD29300D2T90	1%	9.0 V

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

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter <sup>2</sup>	Value	Unit
V <sub>I</sub>	DC Input Voltage	30 (*)	V
I <sub>O</sub>	Output Current	Internally Limited	mA
P <sub>D</sub>	Power Dissipation	Internally Limited	mW
T <sub>stg</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>op</sub>	Operating Junction Temperature Range	-40 to 125	°C

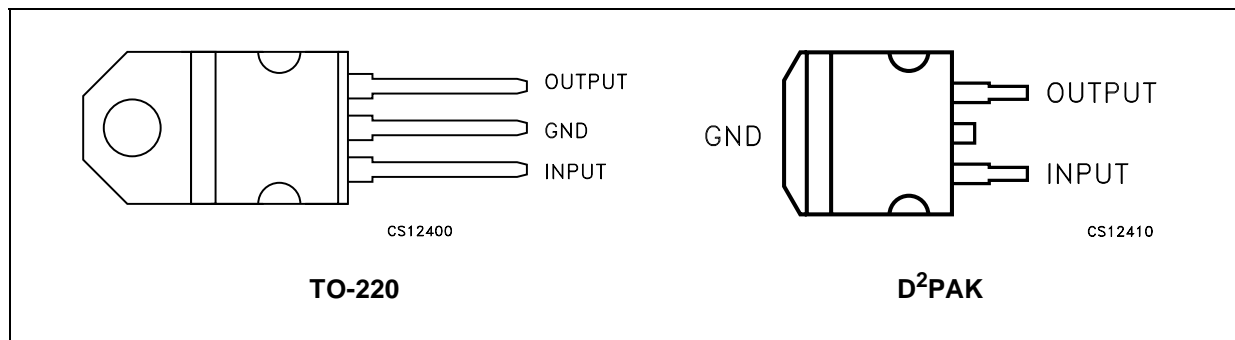
(\*) Above 14V the device is automatically in shut-down.

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

### THERMAL DATA

Symbol	Parameter	TO-220	D <sup>2</sup> PAK	Unit
R <sub>thj-case</sub>	Thermal Resistance Junction-case	3	3	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient	50	60	°C/W

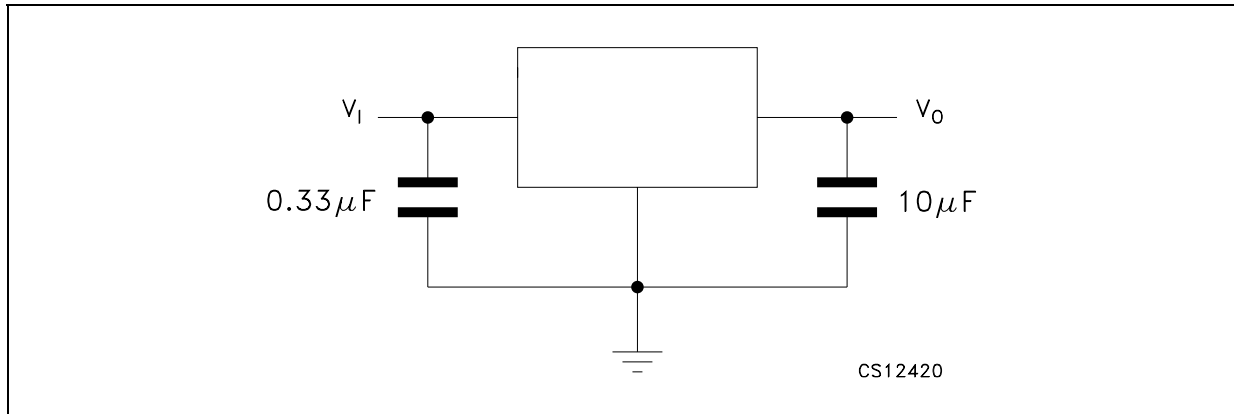
### CONNECTION DIAGRAM (top view)



### PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1	1	Input
2	2	GND
3	3	Output

## APPLICATION CIRCUIT



## ELECTRICAL CHARACTERISTICS OF LD29300#15

( $I_O = 10\text{mA}$ ,  $T_J = 25^\circ\text{C}$ ,  $V_I = 3.5\text{V}$ ,  $C_I = 330\text{nF}$ ,  $C_O = 10\mu\text{F}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_I$	Minimum Operating Input Voltage	$I_O = 10\text{mA}$ to $3\text{A}$ $T_J = -40$ to $125^\circ\text{C}$	2.5			V
$V_O$	Output Voltage	$I_O = 10\text{mA}$ to $3\text{A}$ , $V_I = 3$ to $5\text{V}$ $T_J = -40$ to $125^\circ\text{C}$	1.485	1.5	1.515	V
$\Delta V_O$	Load Regulation	$I_O = 10\text{mA}$ to $3\text{A}$		0.2	1.0	%
$\Delta V_O$	Line Regulation	$V_I = 3$ to $14\text{V}$		0.06	0.5	%
SVR	Supply Voltage Rejection	$f = 120\text{ Hz}$ , $V_I = 3.5 \pm 1\text{V}$ , $I_O = 1.5\text{A}$	65	75		dB
$I_q$	Quiescent Current	$I_O = 1.5\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		20	50	mA
		$I_O = 3\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		45	100	
$I_{sc}$	Short Circuit Current	$R_L = 0$		4.5		A
eN	Output Noise Voltage	$B_P = 10\text{Hz}$ to $100\text{KHz}$ , $I_O = 100\text{mA}$		60		$\mu\text{V}_{\text{RMS}}$

## ELECTRICAL CHARACTERISTICS OF LD29300#18

( $I_O = 10\text{mA}$ ,  $T_J = 25^\circ\text{C}$ ,  $V_I = 3.8\text{V}$ ,  $C_I = 330\text{nF}$ ,  $C_O = 10\mu\text{F}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$I_O = 10\text{mA}$ to $3\text{A}$ , $V_I = 3$ to $5\text{V}$ $T_J = -40$ to $125^\circ\text{C}$	1.782	1.8	1.818	V
			1.764		1.836	
$\Delta V_O$	Load Regulation	$I_O = 10\text{mA}$ to $3\text{A}$		0.2	1.0	%
$\Delta V_O$	Line Regulation	$V_I = 3$ to $14\text{V}$		0.06	0.5	%
SVR	Supply Voltage Rejection	$f = 120\text{ Hz}$ , $V_I = 3.8 \pm 1\text{V}$ , $I_O = 1.5\text{A}$	62	72		dB
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 500\text{mA}$ , $T_J = -40$ to $125^\circ\text{C}$ (Note 1)		0.1		V
		$I_O = 1.5\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$ (Note 1)		0.2		
		$I_O = 3\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$ (Note 1)		0.4	0.7	
$I_q$	Quiescent Current	$I_O = 1.5\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		20	50	mA
		$I_O = 3\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		45	100	
$I_{sc}$	Short Circuit Current	$R_L = 0$		4.5		A
eN	Output Noise Voltage	$B_P = 10\text{Hz}$ to $100\text{KHz}$ , $I_O = 100\text{mA}$		60		$\mu\text{V}_{\text{RMS}}$

NOTE 1: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with  $V_O + 1\text{V}$  applied to  $V_I$ .

## LD29300 SERIES

### ELECTRICAL CHARACTERISTICS OF LD29300#25

( $I_O = 10\text{mA}$ ,  $T_J = 25^\circ\text{C}$ ,  $V_I = 4.5\text{V}$ ,  $C_I = 330\text{nF}$ ,  $C_O = 10\mu\text{F}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$I_O = 10\text{mA to } 3\text{A}$ , $V_I = 3.5 \text{ to } 5.5\text{V}$ $T_J = -40 \text{ to } 125^\circ\text{C}$	2.475	2.5	2.525	V
			2.45		2.55	
$\Delta V_O$	Load Regulation	$I_O = 10\text{mA to } 3\text{A}$		0.2	1.0	%
$\Delta V_O$	Line Regulation	$V_I = 3.5 \text{ to } 14\text{V}$		0.06	0.5	%
SVR	Supply Voltage Rejection	$f = 120 \text{ Hz}$ , $V_I = 4.5 \pm 1\text{V}$ , $I_O = 1.5\text{A}$	55	70		dB
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 500\text{mA}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$ (Note 1)		0.1		V
		$I_O = 1.5\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$ (Note 1)		0.2		
		$I_O = 3\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$ (Note 1)		0.4	0.7	
$I_q$	Quiescent Current	$I_O = 1.5\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$		20	50	mA
		$I_O = 3\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$		45	100	
$I_{\text{sc}}$	Short Circuit Current	$R_L = 0$		4.5		A
eN	Output Noise Voltage	$B_P = 10\text{Hz to } 100\text{kHz}$ , $I_O = 100\text{mA}$		100		$\mu\text{V}_{\text{RMS}}$

NOTE 1: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with  $V_O + 1\text{V}$  applied to  $V_I$ .

### ELECTRICAL CHARACTERISTICS OF LD29300#33

( $I_O = 10\text{mA}$ ,  $T_J = 25^\circ\text{C}$ ,  $V_I = 5.3\text{V}$ ,  $C_I = 330\text{nF}$ ,  $C_O = 10\mu\text{F}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$I_O = 10\text{mA to } 3\text{A}$ , $V_I = 4.3 \text{ to } 6.3\text{V}$ $T_J = -40 \text{ to } 125^\circ\text{C}$	3.267	3.3	3.333	V
			3.234		3.366	
$\Delta V_O$	Load Regulation	$I_O = 10\text{mA to } 3\text{A}$		0.2	1.0	%
$\Delta V_O$	Line Regulation	$V_I = 4.3 \text{ to } 14\text{V}$		0.06	0.5	%
SVR	Supply Voltage Rejection	$f = 120 \text{ Hz}$ , $V_I = 5.3 \pm 1\text{V}$ , $I_O = 1.5\text{A}$	52	67		dB
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 500\text{mA}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$ (Note 1)		0.1		V
		$I_O = 1.5\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$ (Note 1)		0.2		
		$I_O = 3\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$ (Note 1)		0.4	0.7	
$I_q$	Quiescent Current	$I_O = 1.5\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$		20	50	mA
		$I_O = 3\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$		45	100	
$I_{\text{sc}}$	Short Circuit Current	$R_L = 0$		4.5		A
eN	Output Noise Voltage	$B_P = 10\text{Hz to } 100\text{kHz}$ , $I_O = 100\text{mA}$		132		$\mu\text{V}_{\text{RMS}}$

NOTE 1: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with  $V_O + 1\text{V}$  applied to  $V_I$ .

**ELECTRICAL CHARACTERISTICS OF LD29300#50**(I<sub>O</sub> = 10mA, T<sub>J</sub> = 25°C, V<sub>I</sub> = 5.3V, C<sub>I</sub> = 330nF, C<sub>O</sub> = 10μF)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>O</sub>	Output Voltage	I <sub>O</sub> = 10mA to 3A, V <sub>I</sub> = 6 to 8V T <sub>J</sub> = -40 to 125°C	4.95 4.9	5	5.05 5.1	V
ΔV <sub>O</sub>	Load Regulation	I <sub>O</sub> = 10mA to 3A		0.2	1.0	%
ΔV <sub>O</sub>	Line Regulation	V <sub>I</sub> = 6 to 14V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V <sub>I</sub> = 7 ± 1V, I <sub>O</sub> = 1.5A	49	64		dB
V <sub>DROP</sub>	Dropout Voltage	I <sub>O</sub> = 500mA, T <sub>J</sub> = -40 to 125°C (Note 1)		0.1		V
		I <sub>O</sub> = 1.5A, T <sub>J</sub> = -40 to 125°C (Note 1)		0.2		
		I <sub>O</sub> = 3A, T <sub>J</sub> = -40 to 125°C (Note 1)		0.4	0.7	
I <sub>q</sub>	Quiescent Current	I <sub>O</sub> = 1.5A, T <sub>J</sub> = -40 to 125°C		20	50	mA
		I <sub>O</sub> = 3A, T <sub>J</sub> = -40 to 125°C		45	100	
I <sub>sc</sub>	Short Circuit Current	R <sub>L</sub> = 0		4.5		A
eN	Output Noise Voltage	B <sub>p</sub> = 10Hz to 100KHz I <sub>O</sub> = 100mA		200		μV <sub>RMS</sub>

NOTE 1: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V<sub>O</sub>+1V applied to V<sub>I</sub>.

**ELECTRICAL CHARACTERISTICS OF LD29300#80**(I<sub>O</sub> = 10mA, T<sub>J</sub> = 25°C, V<sub>I</sub> = 10V, C<sub>I</sub> = 330nF, C<sub>O</sub> = 10μF)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>O</sub>	Output Voltage	I <sub>O</sub> = 10mA to 3A, V <sub>I</sub> = 9 to 11V T <sub>J</sub> = -40 to 125°C	7.92 7.84	8	8.08 8.16	V
ΔV <sub>O</sub>	Load Regulation	I <sub>O</sub> = 10mA to 3A		0.2	1.0	%
ΔV <sub>O</sub>	Line Regulation	V <sub>I</sub> = 9 to 14V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V <sub>I</sub> = 9 ± 1V, I <sub>O</sub> = 1.5A	45	59		dB
V <sub>DROP</sub>	Dropout Voltage	I <sub>O</sub> = 500mA, T <sub>J</sub> = -40 to 125°C (Note 1)		0.1		V
		I <sub>O</sub> = 1.5A, T <sub>J</sub> = -40 to 125°C (Note 1)		0.2		
		I <sub>O</sub> = 3A, T <sub>J</sub> = -40 to 125°C (Note 1)		0.4	0.7	
I <sub>q</sub>	Quiescent Current	I <sub>O</sub> = 1.5A, T <sub>J</sub> = -40 to 125°C		20	50	mA
		I <sub>O</sub> = 3A, T <sub>J</sub> = -40 to 125°C		45	100	
I <sub>sc</sub>	Short Circuit Current	R <sub>L</sub> = 0		4.5		A
eN	Output Noise Voltage	B <sub>p</sub> = 10Hz to 100KHz I <sub>O</sub> = 100mA		320		μV <sub>RMS</sub>

NOTE 1: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V<sub>O</sub>+1V applied to V<sub>I</sub>.

## LD29300 SERIES

### ELECTRICAL CHARACTERISTICS OF LD29300#90

( $I_O = 10\text{mA}$ ,  $T_J = 25^\circ\text{C}$ ,  $V_I = 11\text{V}$ ,  $C_I = 330\text{nF}$ ,  $C_O = 10\mu\text{F}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$I_O = 10\text{mA}$ to $3\text{A}$ , $V_I = 10$ to $12\text{V}$ $T_J = -40$ to $125^\circ\text{C}$	8.91	9	9.09	V
			8.82		9.18	
$\Delta V_O$	Load Regulation	$I_O = 10\text{mA}$ to $3\text{A}$		0.2	1.0	%
$\Delta V_O$	Line Regulation	$V_I = 10$ to $14\text{V}$		0.06	0.5	%
SVR	Supply Voltage Rejection	$f = 120\text{Hz}$ , $V_I = 11 \pm 1\text{V}$ , $I_O = 1.5\text{A}$	45	58		dB
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 500\text{mA}$ , $T_J = -40$ to $125^\circ\text{C}$ (Note 1)		0.1		V
		$I_O = 1.5\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$ (Note 1)		0.2		
		$I_O = 3\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$ (Note 1)		0.4	0.7	
$I_q$	Quiescent Current	$I_O = 1.5\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		20	50	mA
		$I_O = 3\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		50	100	
$I_{\text{sc}}$	Short Circuit Current	$R_L = 0$		4.5		A
eN	Output Noise Voltage	$B_P = 10\text{Hz}$ to $100\text{KHz}$ , $I_O = 100\text{mA}$		360		$\mu\text{V}_{\text{RMS}}$

NOTE 1: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with  $V_O + 1\text{V}$  applied to  $V_I$ .

TYPICAL CHARACTERISTICS ( $I_O = 10\text{mA}$ ,  $T_J = 25^\circ\text{C}$ ,  $V_I = 11\text{V}$ ,  $C_I = 330\text{nF}$ ,  $C_O = 10\mu\text{F}$ )

Figure 1 : Output Voltage vs Temperature

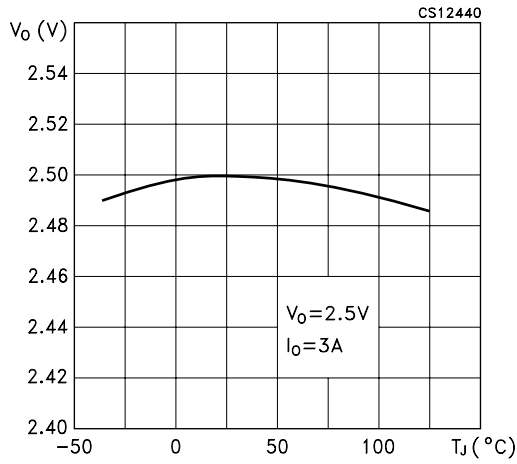


Figure 2 : Dropout Voltage vs Temperature

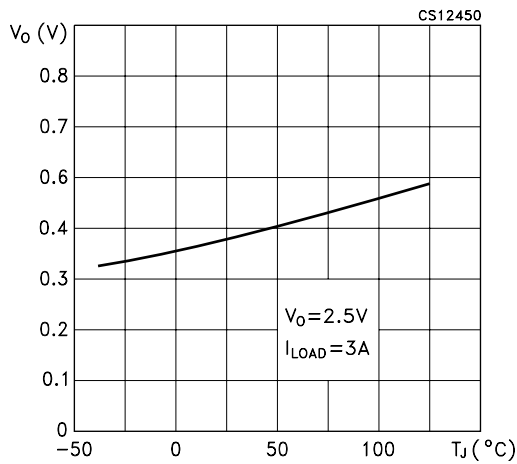


Figure 3 : Dropout Voltage vs Output Current

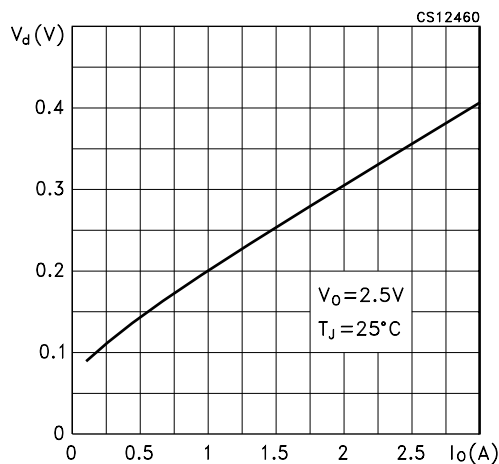


Figure 4 : Quiescent Current vs Output Current

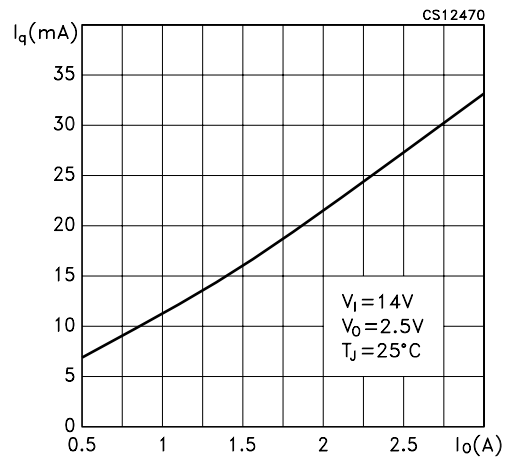


Figure 5 : Quiescent Current vs Output Current

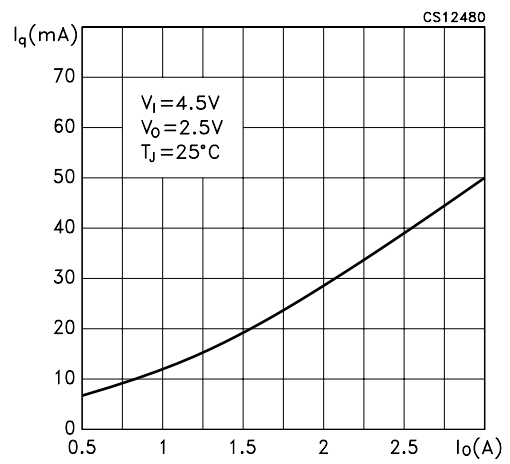


Figure 6 : Quiescent Current vs Supply Voltage

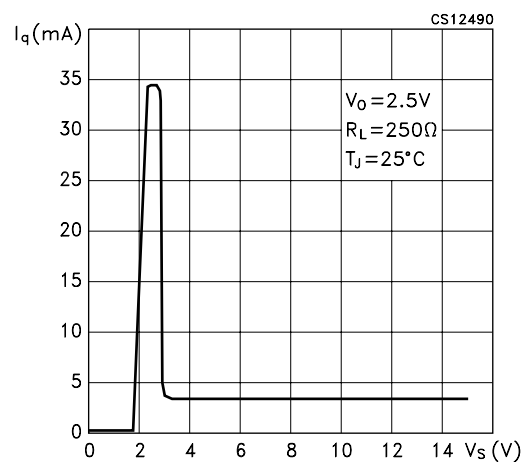


Figure 7 : Quiescent Current vs Temperature

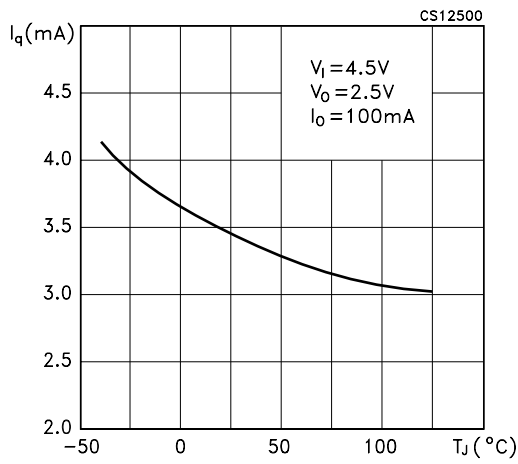


Figure 10 : Supply Voltage Rejection vs Temperature

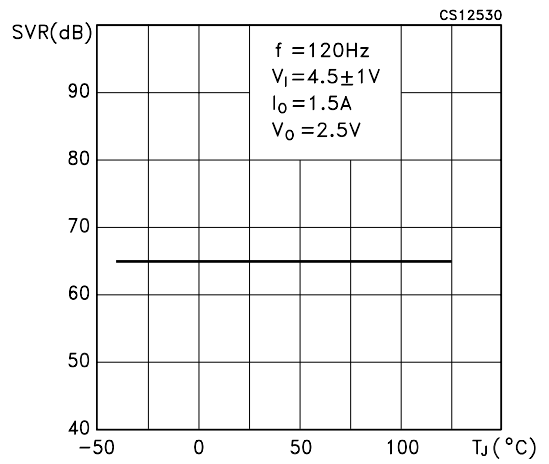


Figure 8 : Quiescent Current vs Temperature

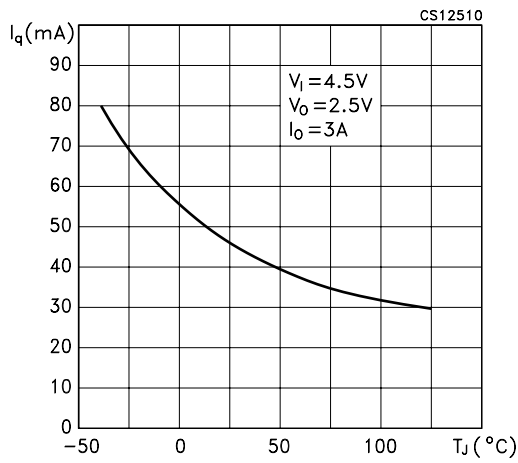


Figure 11 : Stability vs COUT

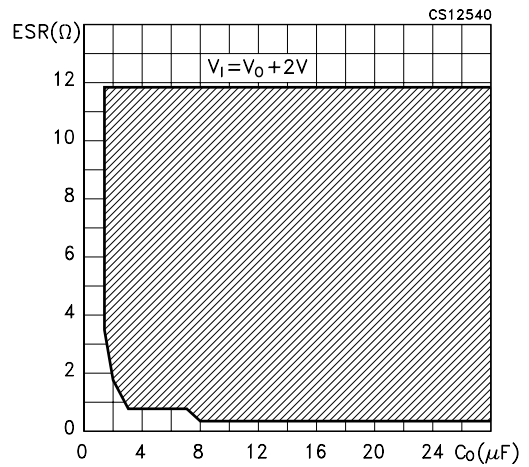


Figure 9 : Short Circuit Current vs Temperature

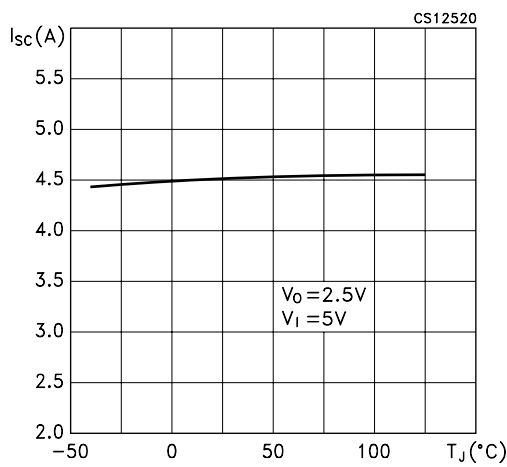


Figure 12 : Line Transient

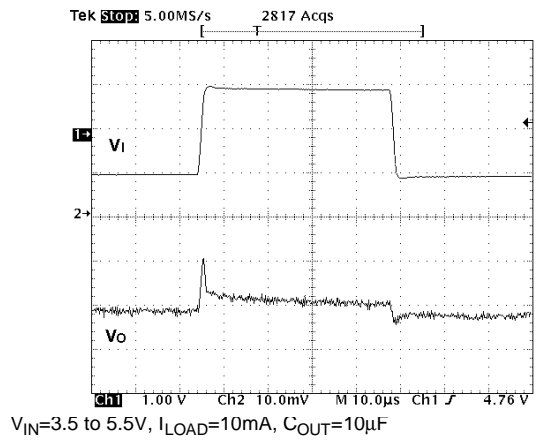
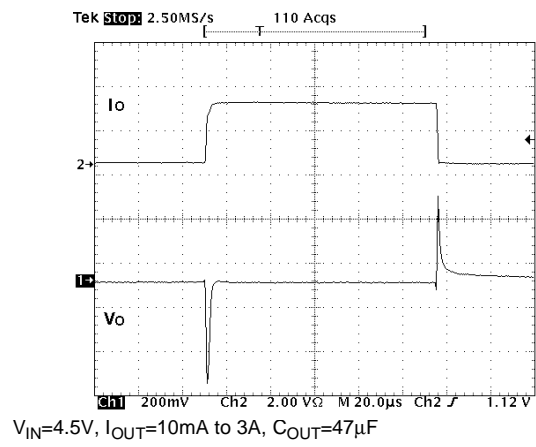


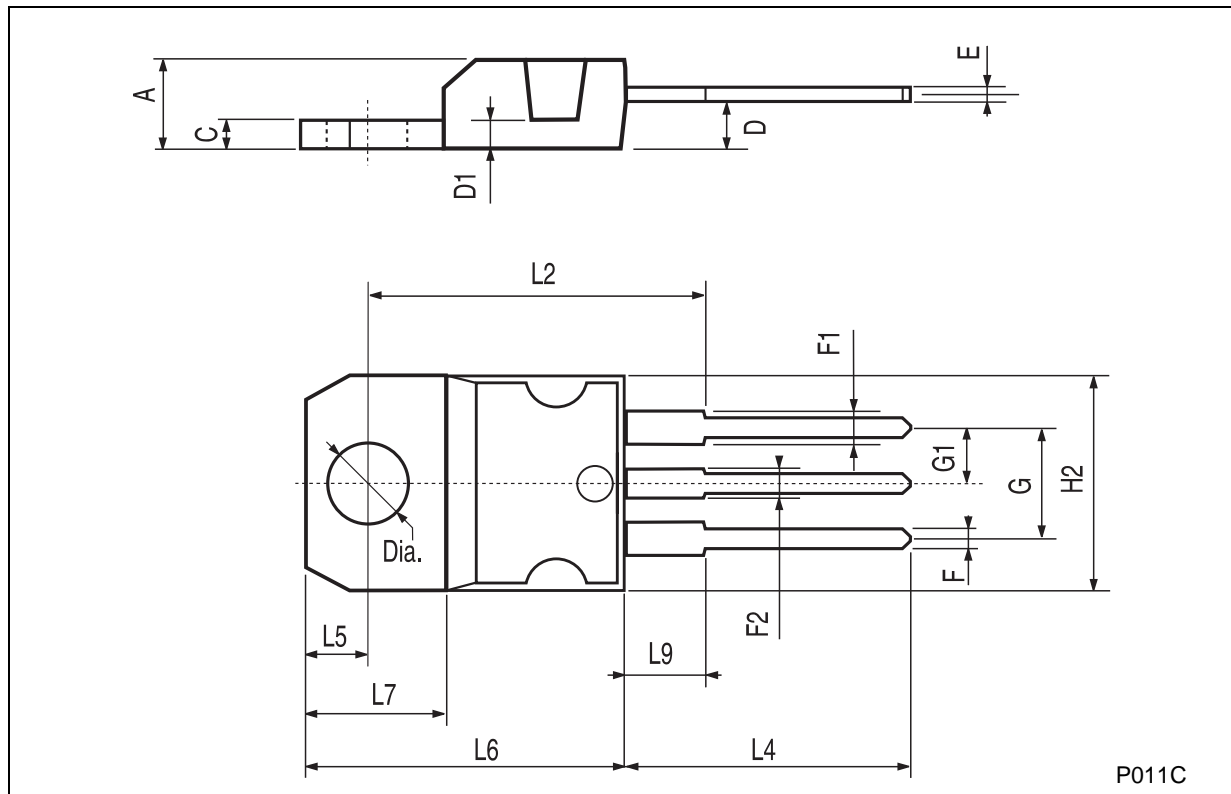


Figure 13 : Load Transient



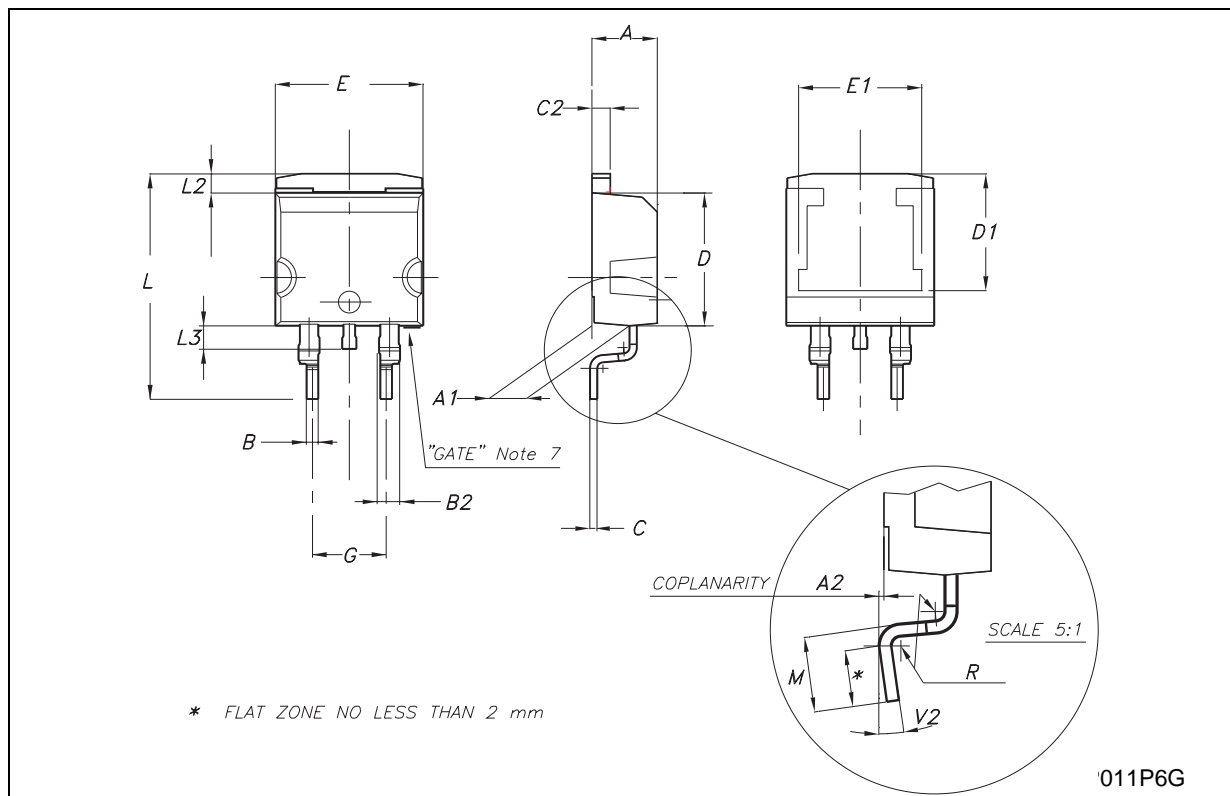
TO-220 MECHANICAL DATA

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



D<sup>2</sup>PAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		0.409
E1		8.5			0.335	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.016	
V2	0°		8°	0°		8°



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