

TLV2217-33 LOW-DROPOUT 3.3-V FIXED-VOLTAGE REGULATORS

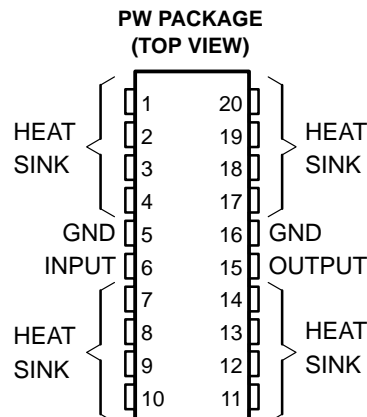
SLVS067H – MARCH 1992 – REVISED MAY 2003

- **Fixed 3.3-V Output**
- **$\pm 1\%$ Maximum Output Voltage Tolerance at $T_J = 25^\circ\text{C}$**
- **500-mV Maximum Dropout Voltage at 500 mA**
- **500-mA Dropout Current**
- **$\pm 2\%$ Absolute Output Voltage Variation**
- **Internal Overcurrent Limiting**
- **Internal Thermal-Overload Protection**
- **Internal Overvoltage Protection**

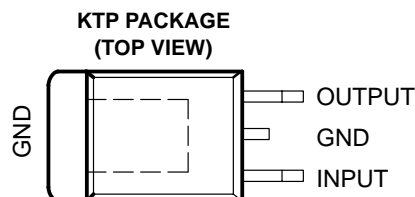
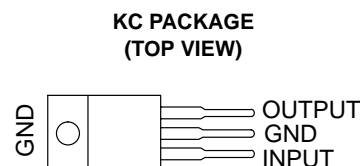
description/ordering information

The TLV2217-33 is a low-dropout 3.3-V fixed-voltage regulator. The regulator is capable of sourcing 500 mA of current with an input-output differential of 0.5 V, or less. The TLV2217-33 provides internal overcurrent limiting, thermal-overload protection, and overvoltage protection.

The 0.5-V dropout for the TLV2217-33 makes it ideal for battery applications in 3.3-V logic systems. For example, battery input voltage to the regulator can drop as low as 3.8 V, and the TLV2217-33 can continue to regulate the system. For higher voltage systems, the TLV2217-33 can be operated with a continuous input voltage of 12 V.



HEAT SINK – These terminals have an internal resistive connection to ground and should be grounded or electrically isolated.



ORDERING INFORMATION

T_J	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 125°C	POWER-FLEX (KTP)	Reel of 3000	TLV2217-33KTPR	2217-33
	TO-220 (KC)	Tube of 50	TLV2217-33KC	TLV2217-33
	TSSOP (PW)	Reel of 2000	TLV2217-33CPWR	2217-33

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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**TEXAS
INSTRUMENTS**

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TLV2217-33

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absolute maximum ratings over operating virtual junction temperature range (unless otherwise noted)[†]

Continuous input voltage, V_I	16 V
Operating virtual junction temperature, T_J	150°C
Storage temperature range, T_{stg}	–65°C to 150°C

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

package thermal data (see Note 1)

PACKAGE	BOARD	θ_{JC}	θ_{JA}
POWER-FLEX (KTP)	High K, JESD 51-5	19°C/W	28°C/W
TO-220 (KC)	High K, JESD 51-5	3°C/W	19°C/W
TSSOP (PW)	High K, JESD 51-7	32°C/W	83°C/W

NOTE 1: Maximum power dissipation is a function of $T_{J(max)}$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_{J(max)} - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can impact reliability. Due to variation in individual device electrical characteristics and thermal resistance, the built-in thermal overload protection may be activated at power levels slightly above or below the rated dissipation.

recommended operating conditions

	MIN	MAX	UNIT
V_I Input voltage	3.8	12	V
I_O Output current	0	500	mA
T_J Operating virtual junction temperature range	0	125	°C

electrical characteristics at $V_I = 4.5$ V, $I_O = 500$ mA, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS‡		TLV2217-33			UNIT
			MIN	TYP	MAX	UNIT
Output voltage	I _O = 20 mA to 500 mA, V _I = 3.8 V to 5.5 V	T _J = 25°C	3.267	3.30	3.333	V
		T _J = 0°C to 125°C	3.234		3.366	
Input voltage regulation	V _I = 3.8 V to 5.5 V		5 15			mV
Ripple rejection	f = 120 Hz, V _{ripple} = 1 V _{PP}		–62			dB
Output voltage regulation	I _O = 20 mA to 500 mA		5 30			mV
Output noise voltage	f = 10 Hz to 100 kHz		500			μV
Dropout voltage	I _O = 250 mA		400			mV
	I _O = 500 mA		500			
Bias current	I _O = 0		2 5			mA
	I _O = 500 mA		19 49			

[‡] Pulse-testing techniques are used to maintain the virtual junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 22-μF tantalum capacitor with equivalent series resistance of 1.5 Ω on the output.



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electrical characteristics at $V_I = 4.5\text{ V}$, $I_O = 500\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITION†	TLV2217-33Y			UNIT
		MIN	TYP	MAX	
Output voltage	$I_O = 20\text{ mA to }500\text{ mA}$, $V_I = 3.8\text{ V to }5.5\text{ V}$	3.267	3.30	3.333	V
Input voltage regulation	$V_I = 3.8\text{ V to }5.5\text{ V}$		5	15	mV
Ripple rejection	$f = 120\text{ Hz}$, $V_{\text{ripple}} = 1\text{ V}_{\text{PP}}$		-62		dB
Output voltage regulation	$I_O = 20\text{ mA to }500\text{ mA}$		5	30	mV
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$		500		μV
Dropout voltage	$I_O = 250\text{ mA}$			400	mV
	$I_O = 500\text{ mA}$			500	
Bias current	$I_O = 0$		2	5	mA
	$I_O = 500\text{ mA}$		19	49	

† Pulse-testing techniques are used to maintain the virtual junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a $0.1\text{-}\mu\text{F}$ capacitor across the input and a $22\text{-}\mu\text{F}$ tantalum capacitor with equivalent series resistance of $1.5\ \Omega$ on the output.

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COMPENSATION-CAPACITOR SELECTION INFORMATION

The TLV2217-33 is a low-dropout regulator. This means that the capacitance loading is important to the performance of the regulator because it is a vital part of the control loop. The capacitor value and the equivalent series resistance (ESR) both affect the control loop and must be defined for the load range and the temperature range. Figures 1 and 2 can be used to establish the capacitance value and ESR range for best regulator performance.

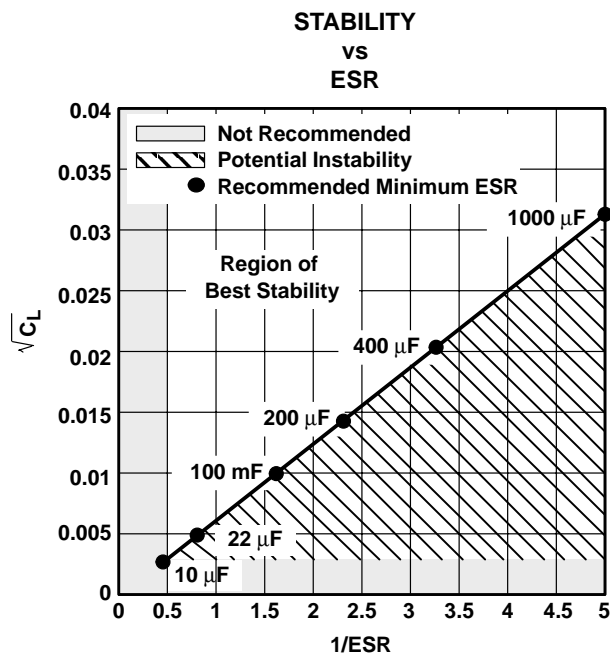
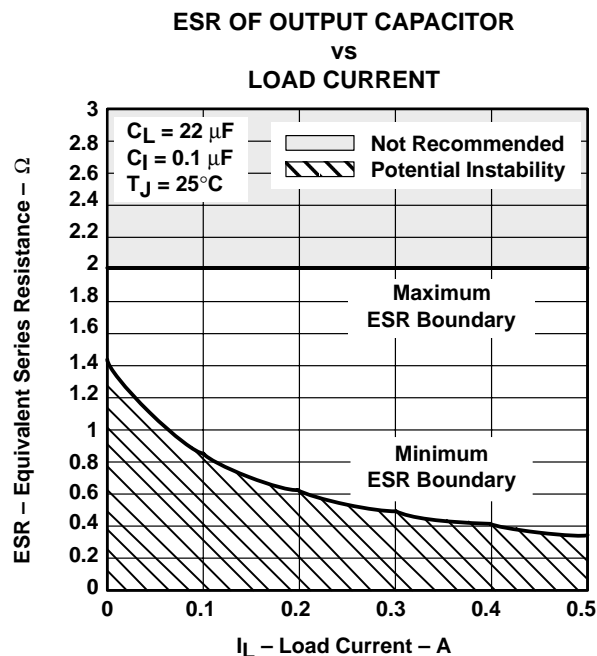


Figure 2

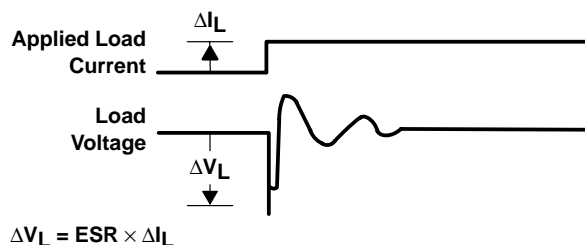


Figure 1

APPLICATION INFORMATION

application schematic

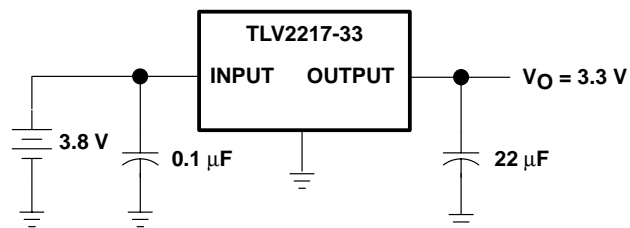
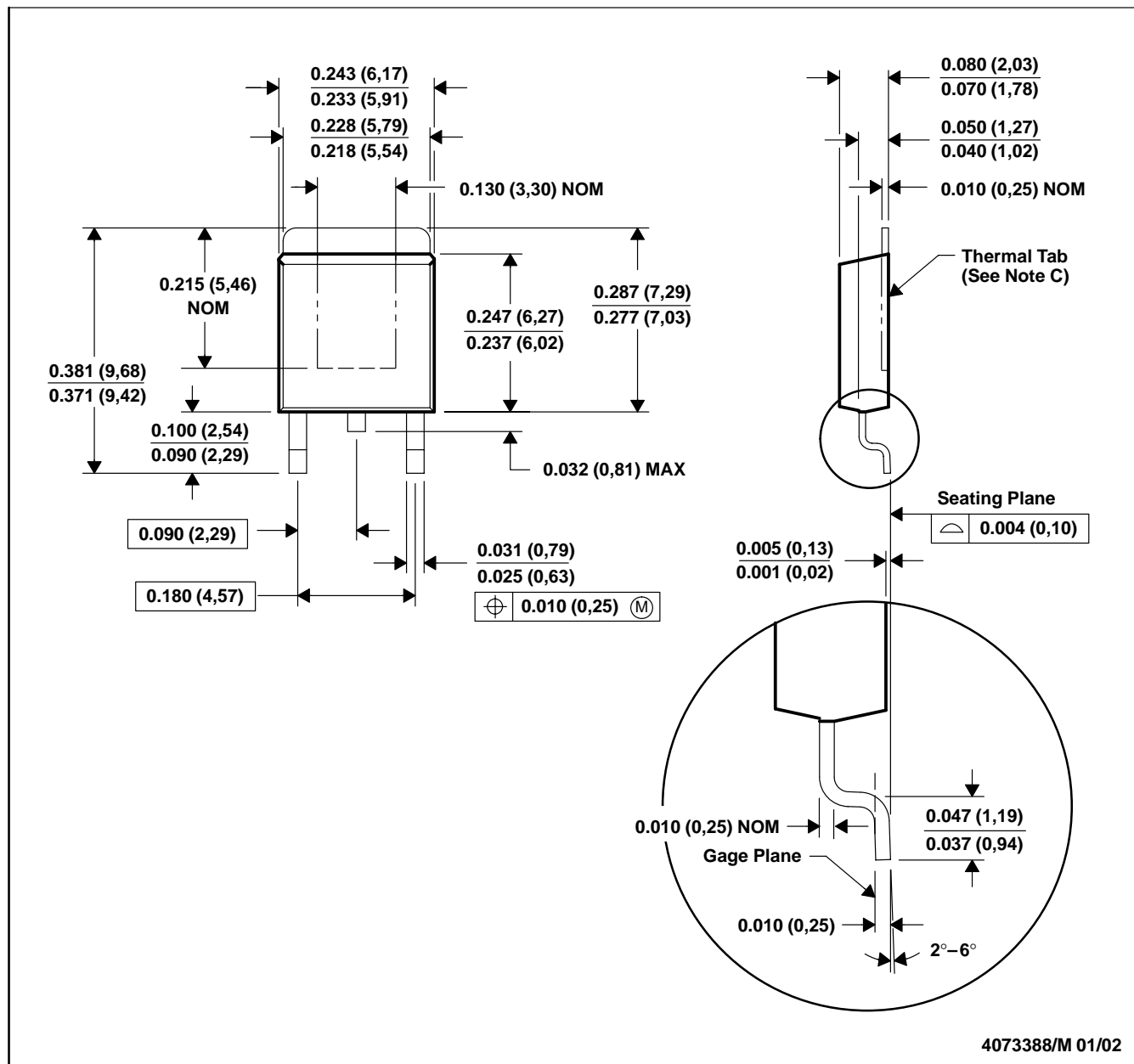


Figure 3

KTP (R-PSFM-G2)

PowerFLEX™ PLASTIC FLANGE-MOUNT PACKAGE

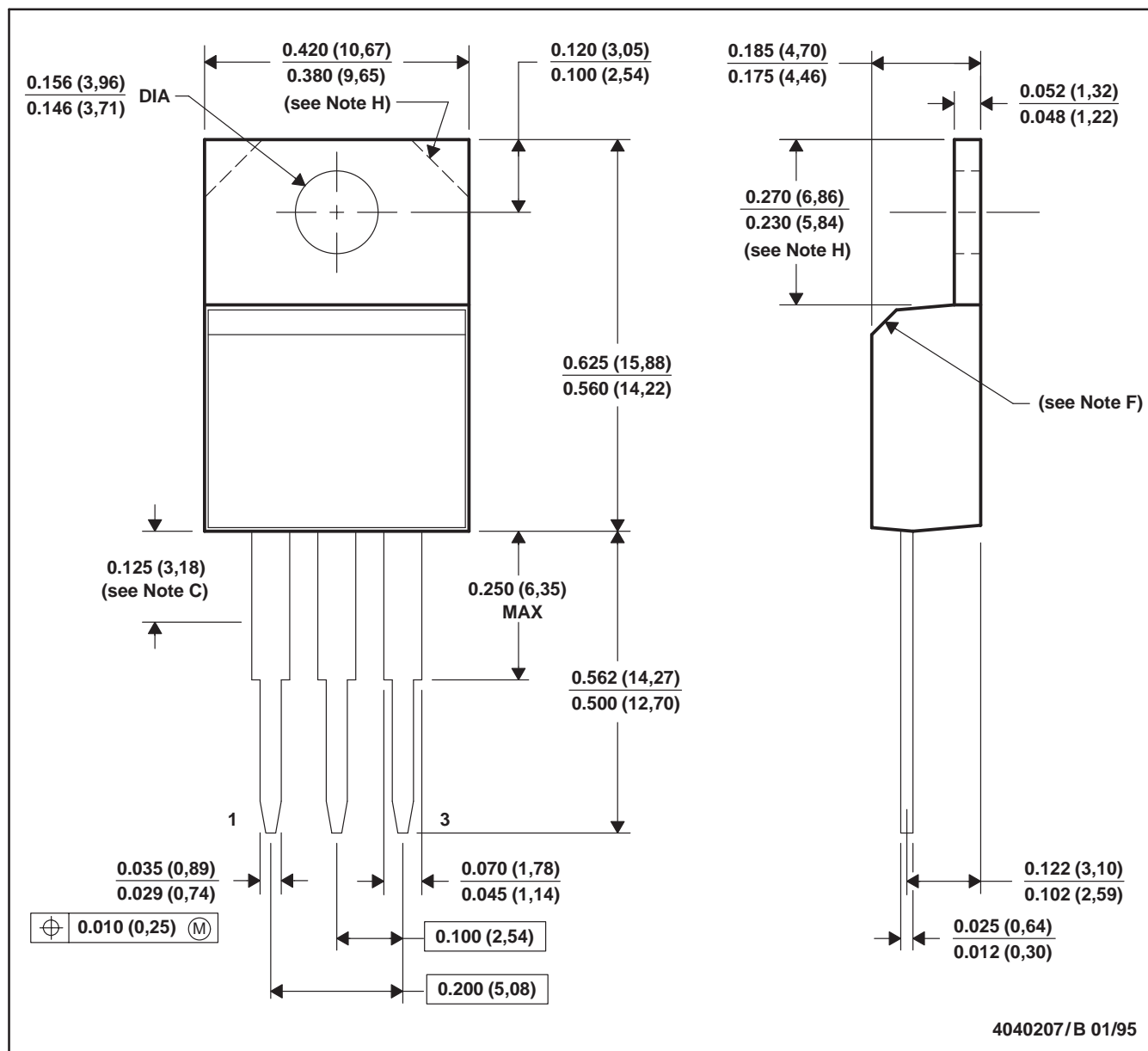


- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - The center lead is in electrical contact with the thermal tab.
 - Dimensions do not include mold protrusions, not to exceed 0.006 (0,15).
 - Falls within JEDEC TO-252 variation AC.

PowerFLEX is a trademark of Texas Instruments.

KC (R-PSFM-T3)

PLASTIC FLANGE-MOUNT PACKAGE



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Lead dimensions are not controlled within this area.
 D. All lead dimensions apply before solder dip.
 E. The center lead is in electrical contact with the mounting tab.
 F. The chamfer is optional.
 G. Falls within JEDEC TO-220AB
 H. Tab contour optional within these dimensions

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

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Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265