



**THE DATASHEET OF**  
**AP7217-33SG-13**



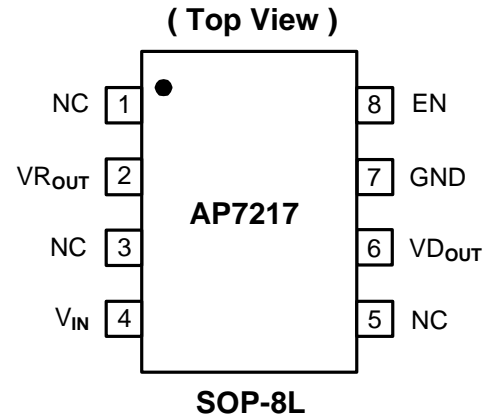
## Description

The AP7217 low-dropout linear regulator operates from a 3.3V to 5.5V supply and delivers a guaranteed 500mA (min) continuous load current.

The high-accuracy output voltage is preset to an internally trimmed voltage. An active-low open-drain reset output remains asserted for at least 20ms (TYP) after output voltage reaches  $V_{DF}$ .

The space-saving SOP-8L package is suitable for “pocket” and hand-held applications.

## Pin Assignments



## Features

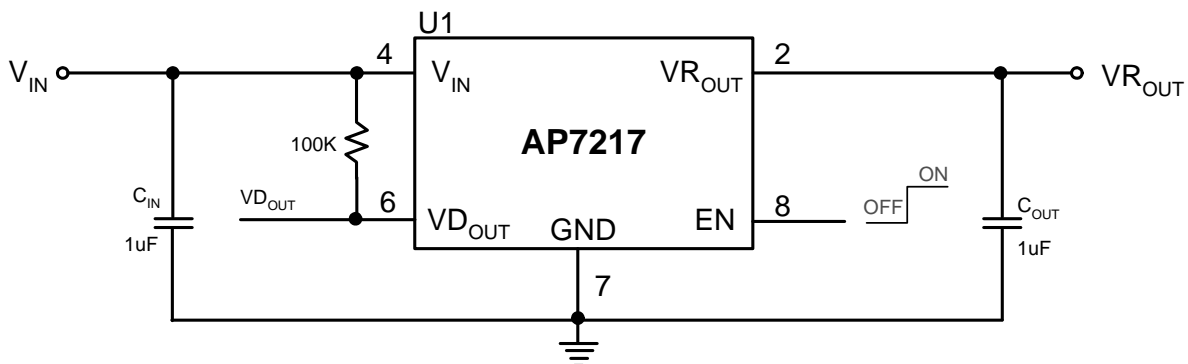
- Very Low Dropout Voltage
- Low Current Consumption: Typ. 50µA
- Output Voltage: 3.3V
- Guaranteed 500mA (min) Output
- Input Range up to 5.5V
- Current Limiting
- Stable with either electrolytic capacitor or low-ESR MLCC (multi-layer ceramic capacitor) Low Temperature Coefficient
- SOP-8L: Available in “Green” Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

## Applications

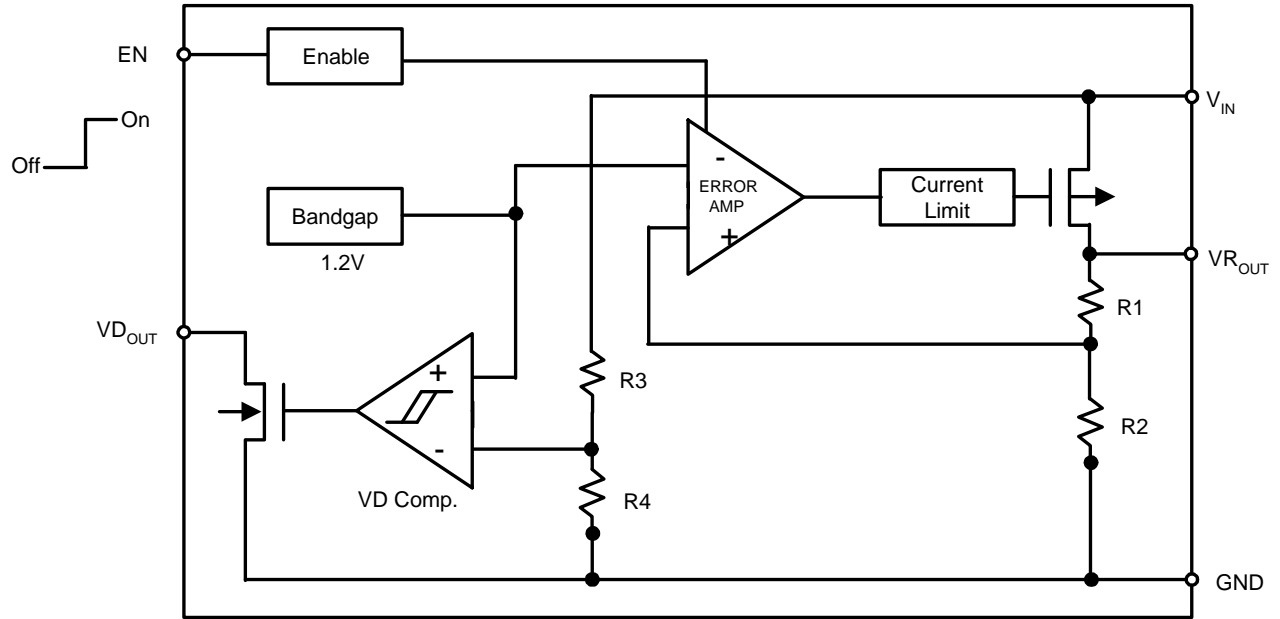
- HD/ BlueRay DVD & MP3/4 Players
- Mobile Handsets and Smartphones
- Digital Still Camera
- Hand-Held Computers

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).

## Typical Application Circuit



**Functional Block Diagram**



**Pin Descriptions**

Pin Name	Pin No.	Description
NC	1	No Connection
V <sub>R_OUT</sub>	2	Voltage Output
NC	3	No Connection
V <sub>IN</sub>	4	Supply Voltage
NC	5	No connection
V <sub>D_OUT</sub>	6	V <sub>D</sub> Output (Reset on I/P)
GND	7	Ground
EN	8	Enable (V <sub>R</sub> On/Off)

### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	KV
ESD MM	Machine Model ESD Protection	450	V
$V_{IN}$	Input Voltage	+6	V
$I_{OUT}$	Output Current	$P_D / (V_{IN} - V_O)$	mA
$V_{R_{OUT}}$	Output Voltage	GND - 0.3 ~ $V_{IN} + 0.3$	V
$T_J$	Operating Junction Temperature Range	-40 to +125	°C
$T_{J(MAX)}$	Maximum Junction Temperature	150	°C
$P_D$	Internal Power Dissipation	1.2	W

### Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
$V_{IN}$	Input Voltage	3.3	5.5	V
$I_{OUT}$	Output Current	0	500	mA
$T_A$	Operating Ambient Temperature	-40	85	°C

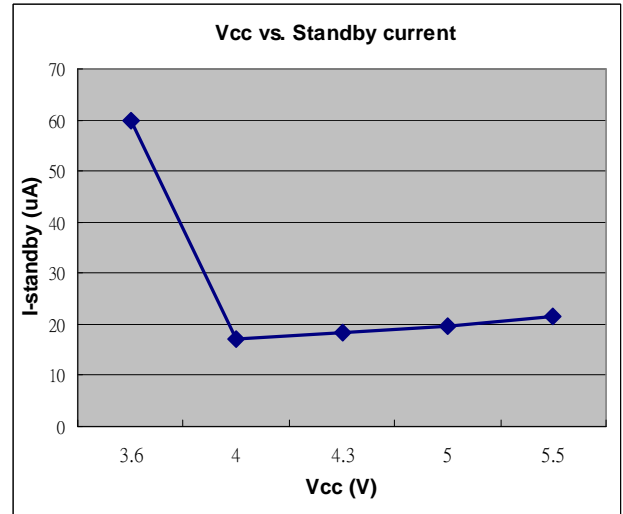
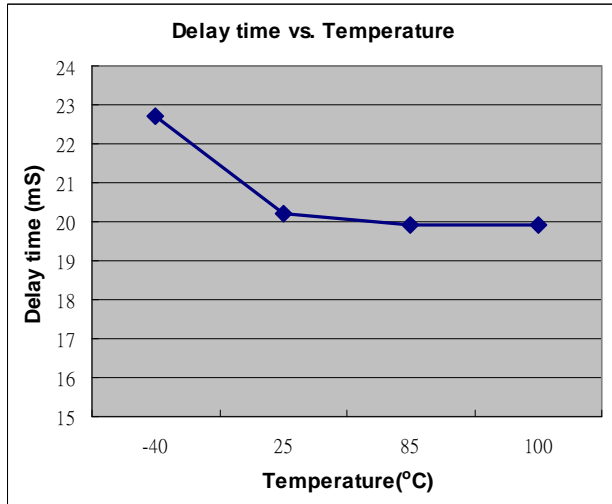
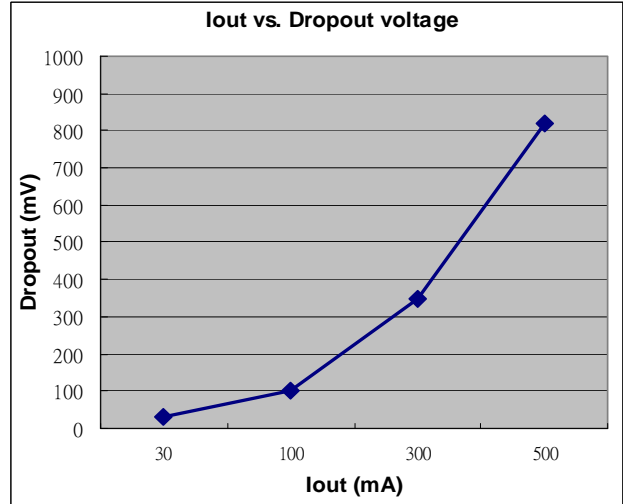
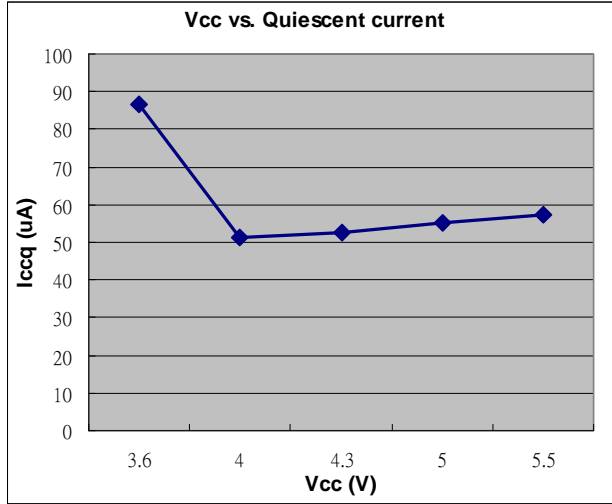
### Electrical Characteristics ( $V_{IN} = 12V$ , $T_A = +25^\circ C$ , unless otherwise noted)

( $T_A = 25^\circ C$ ,  $C_{IN} = 1\mu F$ ,  $C_{OUT} = 1\mu F$ ,  $V_{EN} = V_{IN}$ , unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Unit
$I_Q$	Quiescent Current	$I_O = 0mA$	-	50	70	$\mu A$
$I_{STB}$	Standby Current	$V_{EN} = \text{Off}$ $V_{IN} = 5.0V$		15	30	$\mu A$
$V_{R_{OUT}}$	Output Voltage Accuracy	$I_O = 30mA$ , $V_{IN} = 5V$	3.234	3.300	3.366	V
	$V_{R_{OUT}}$ Temperature Coefficient	$-40^\circ C$ to $85^\circ C$ , $I_{OUT} = 30mA$		$\pm 100$		ppm / $^\circ C$
$V_{DROPOUT}$	Dropout Voltage	$I_{OUT} = 100mA$		100	250	mV
$I_{OUT}$	Maximum Output Current	$V_{IN} = 5.3V$	500			mA
$I_{LIMIT}$	Current Limit	$V_{IN} = 5.3V$		600		mA
$I_{short}$	Short Circuit Current	$V_{IN} = 5.3V$		50		mA
$\Delta V_{LINE}/\Delta V_{IN}/V_{R_{OUT}}$	Line Regulation	$4.3V \leq V_{IN} \leq 5.5V$ ; $I_{OUT} = 30mA$		0.01	$\pm 0.2$	%/V
$\Delta V_{R_{OUT}}$	Load Regulation	$1mA \leq I_{OUT} \leq 100mA$ , $V_{IN} = 5.3V$		15	50	mV
PSRR	Power Supply Rejection	$V_{IN} = 4.3V + 0.5Vp-pAC$ , $I_{OUT} = 50mA$	F = 1KHz	55		dB
$V_{EH}$	EN Input Threshold	Output ON	1.6			V
$V_{EL}$		Output OFF			0.25	V
$I_{EN}$	Enable Pin Current		-0.1		0.1	$\mu A$
$V_{DF}$	Detect fall voltage		3.83	3.91	3.98	V
$V_{Hysteresis}$	$V_D$ Hysteresis Range		$V_{DF} \times 1.02$	$V_{DF} \times 1.05$	$V_{DF} \times 1.08$	V
$I_{VD_{OUT}}$	$V_D$ Supply Current	$V_{D_{OUT}} = 0.5V$		20		mA
		$V_{IN} = 2.0V$ $3.0V$		30		
$t_{RP}$	$V_{D_{OUT}}$ Delay Time	$V_{IN} = 1.8V$ to $V_{DF} + 1V$	10	20	40	mSec
$\theta_{JA}$	Thermal Resistance Junction to Ambient	SOP-8L (Note 2)		134		$^\circ C/W$
$\theta_{JC}$	Thermal Resistance Junction to Case	SOP-8L (Note 2)		28		$^\circ C/W$

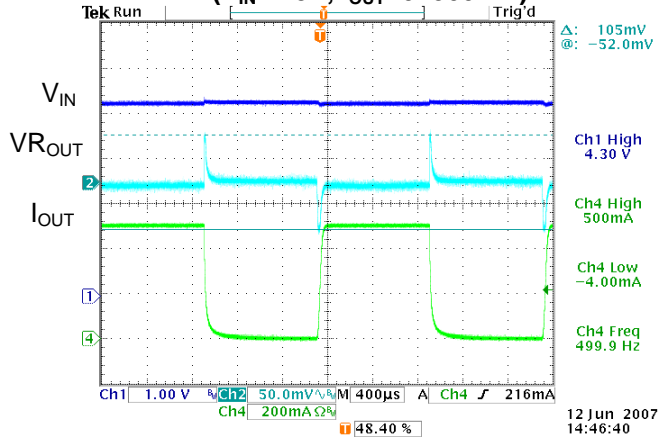
Notes: 2. Test conditions for SOP-8L: Devices mounted on FR-4 PC board, MRP, 2oz copper layout, calibrate at  $T_J = 150^\circ C$ , measure at  $T_A = 25^\circ C$ , minimum recommended pad layout

**Typical Performance Characteristics**

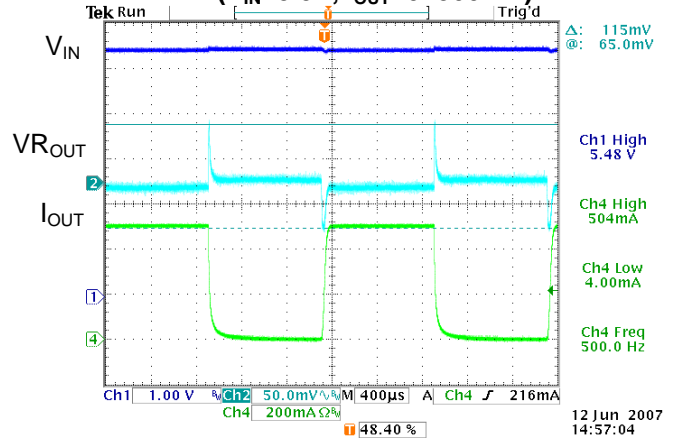


**Typical Performance Characteristics (Continued)**

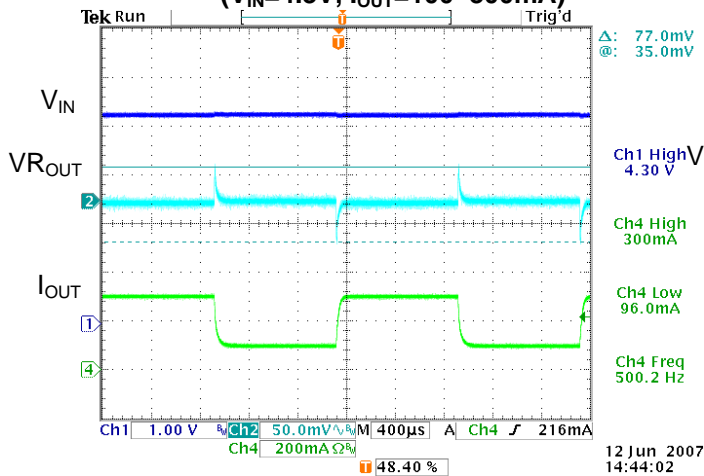
**Load Transient Response**  
( $V_{IN}=4.3V$ ,  $I_{OUT}=0\sim 500mA$ )



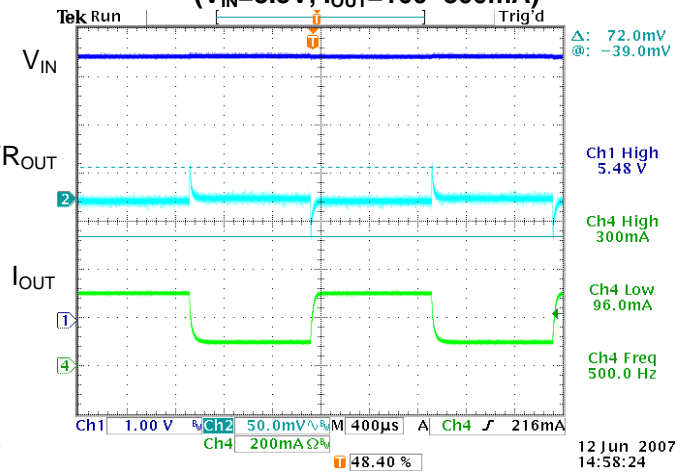
**Load Transient Response**  
( $V_{IN}=5.5V$ ,  $I_{OUT}=0\sim 500mA$ )



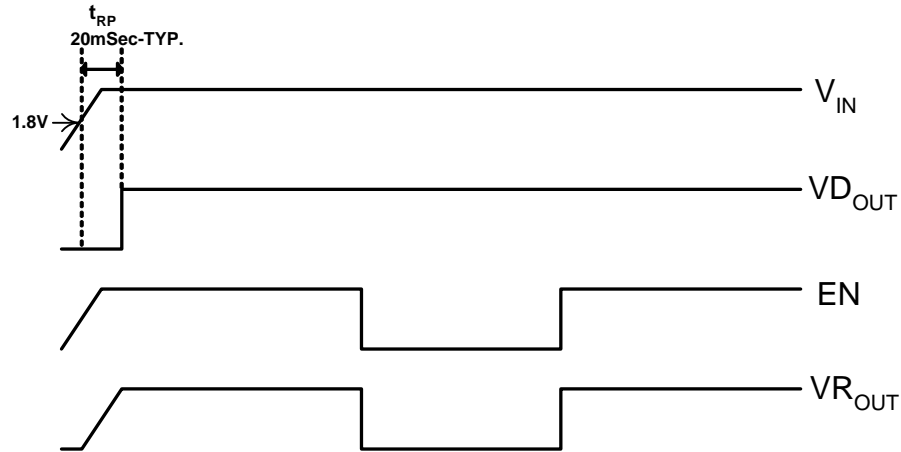
**Load Transient Response**  
( $V_{IN}=4.3V$ ,  $I_{OUT}=100\sim 300mA$ )



**Load Transient Response**  
( $V_{IN}=5.5V$ ,  $I_{OUT}=100\sim 300mA$ )



## Timing Diagram



## Application Note

### Input Capacitor

A 1 $\mu$ F ceramic capacitor is recommended to connect between IN and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. A lower ESR (Equivalent Series Resistance) capacitor allows the use of less capacitance, while higher ESR type requires more capacitance. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both IN and GND.

### Output Capacitor

The output capacitor is required to stabilize and help the transient response of the LDO. The AP7217 is designed to have excellent transient response for most applications with a small amount of output capacitance. The AP7217 is stable with any small ceramic output capacitors of 1.0 $\mu$ F or higher value, and the temperature coefficients of X7R or X5R type. Additional capacitance helps to reduce undershoot and overshoot during transient. For PCB layout, the output capacitor must be placed as close as possible to OUT and GND pins, and keep the leads as short as possible.

### ENABLE/SHUTDOWN Operation

The AP7217 is turned on by setting the EN pin high, and is turned off by pulling it low. If this feature is not used, the EN pin should be tied to IN pin to keep the regulator output on at all time. To ensure proper operation, the signal source used to drive the EN pin must be able to swing above and below the specified turn-on/off voltage thresholds listed in the Electrical Characteristics section under  $V_{IL}$  and  $V_{IH}$ .

	$V_{R\_OUT}$	$V_{D\_OUT}$
EN=0	0V	$\phi$
EN=1	3.3V	$\phi$

### Current Limit Protection

When output current at OUT pin is higher than current limit threshold, the current limit protection will be triggered and clamp the output current to approximately 600mA to prevent over-current and to protect the regulator from damage due to overheating.

**Application Note**

**Short circuit protection**

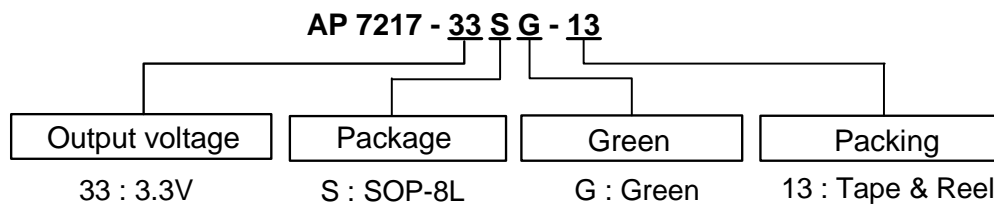
When VRout pin is shorted to GND or VRout voltage is less than 200mV, short circuit protection will be triggered and clamp the output current to approximately 50mA.

**VDOUT (reset output)**

---Open-Drain Active-Low reset---

In general, VDOUT is pulled up by a resistor (100Kohm) to VIN. The AP7217 microprocess (uP) supervisory circuitry asserts a guaranteed logic-low reset during power-up and power-down. Reset is asserted asserts when VIN is below the reset threshold and remain asserted for at least tRP after VIN rises above the reset threshold. As long as VIN is lower than the reset threshold, VDOUT remains at logic "0". When VIN become higher than VTH, a logic "1" is asserted after a time delay defined by tRP.

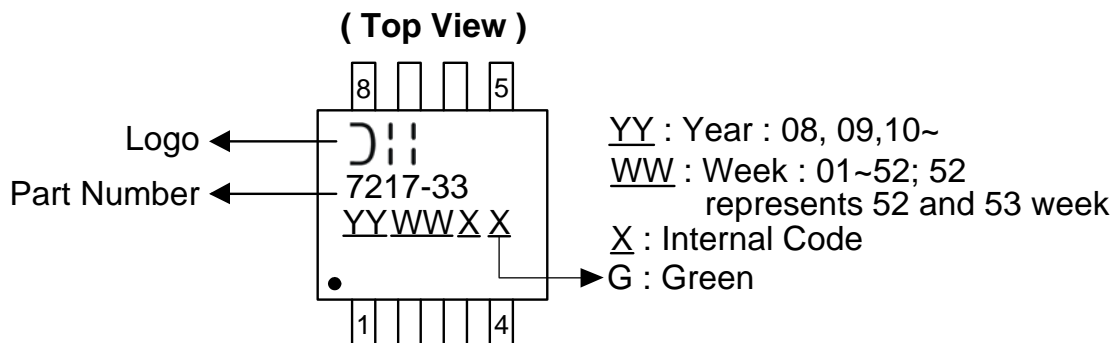
**Ordering Information**



Device	Package Code	Packaging (Note 3)	13" Tape and Reel	
			Quantity	Part Number Suffix
AP7217-33SG-13	S	SOP-8L	2500/Tape & Reel	-13

Notes: 3. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

**Marking Information**





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