WIDE INPUT VOLTAGE RANGE, 150mA ULDO REGULATOR

Description

The DIODES™ AP7383 series is a positive voltage regulator IC.

The AP7383 features a wide-input voltage range, high-accuracy, low-dropout voltage, current limit and ultra-low quiescent current; all of which makes it ideal for use in various USB, portable devices, and instrument application.

The IC consists of a voltage reference, an error amplifier, a resistor network for setting output voltage, a current-limit circuit for current protection, and a chip enable circuit.

The AP7383 is available in 1.8V, 3.0V, 3.3V, 3.45V, 3.6V, 4.15V, 4.4V and 5.0V fixed-output voltage versions.

The AP7383 is available in space-saving SOT25, SOT89 and U-DFN2020-6 (Type C) packages.

Features

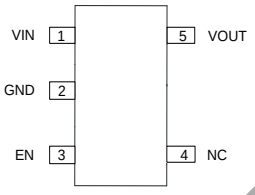
- Wide Input Voltage Range: Up to 30V
- Low Dropout Voltage: V_{DROP} = 500mV @ I_{OUT} = 50mA
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Applications

- Battery-powered equipments
- Laptop, palmtops, notebook computers
- Portable information appliances

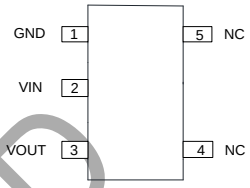
Pin Assignments

(Top View)



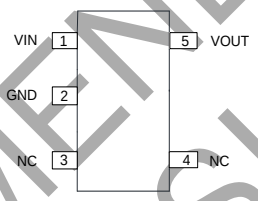
SOT25 (W5)

(Top View)



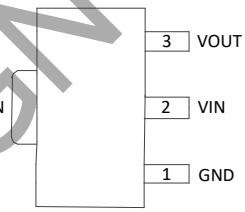
SOT25 (WR)

(Top View)



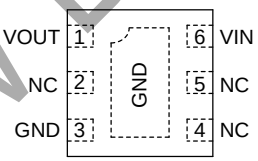
SOT25 (WW)

(Top View)



SOT89

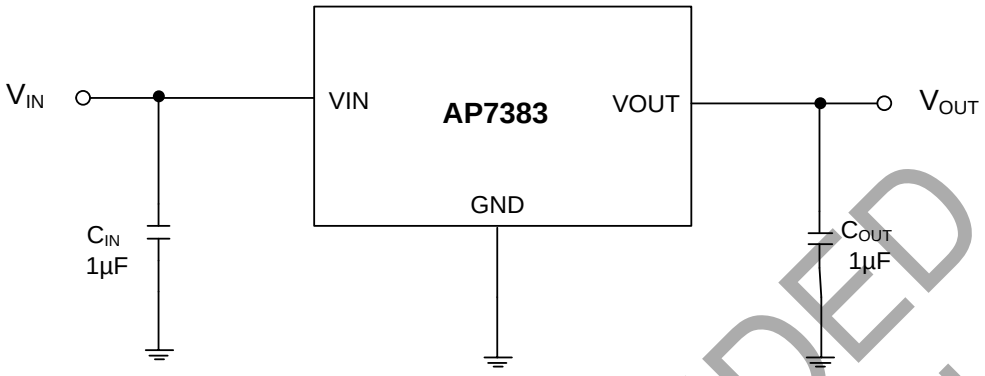
(Top View)



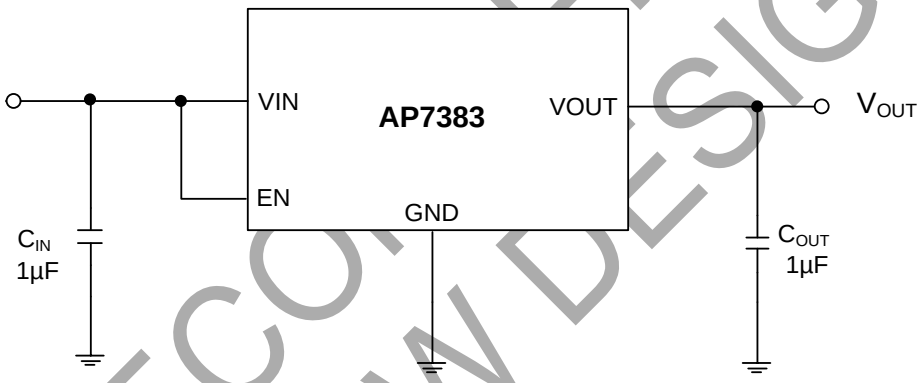
U-DFN2020-6 (Type C)

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Typical Applications Circuit



SOT89 / SOT25 (WR/WW Package) / U-DFN2020-6 (Type C)



SOT25 (W5 Package)

Pin Descriptions

Pin Number					Pin Name	Function
SOT25 (W5 Package)	SOT25 (WR Package)	SOT25 (WW Package)	SOT89	U-DFN2020-6 (Type C)		
1	2	1	2	6	VIN	Input Voltage
2	1	2	1	3	GND	Ground
3	—	—	—	—	EN	Enable Input
4	4, 5	3, 4	—	2, 4, 5	NC	- Not connected for fixed version. - Not connected internally, recommend connection to GND to maximize PCB copper for thermal dissipation.
5	3	5	3	1	VOUT	Regulated Output Voltage

Absolute Maximum Ratings (Note 4) (@ T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Rating		Unit
V_{IN}	Supply Input Voltage	33		V
V_{EN}	Enable Input Voltage	33		V
I_{OUT}	Output Current	200		mA
T_{LEAD}	Lead Temperature (Soldering, 10s)	+260		°C
T_J	Operating Junction Temperature	+150		°C
P_D	Power Dissipation	SOT25 (W5/WW Package)	518	mW
		SOT25 (WR Package)	602	
		SOT89	847	
		U-DFN2020-6 (Type C)	658	
Θ_{JA}	Thermal Resistance (Junction to Ambient)	SOT25 (W5/WW Package)	193	°C/W
		SOT25 (WR Package)	166	
		SOT89	118	
		U-DFN2020-6 (Type C)	152	
Θ_{JC}	Thermal Resistance (Junction to Case)	SOT25 (W5/WW Package)	68	°C/W
		SOT25 (WR Package)	26	
		SOT89	20	
		U-DFN2020-6 (Type C)	58	
T_{STG}	Storage Temperature Range	-65 to +150		°C
—	ESD (Machine Model)	250		V
—	ESD (Human Body Model)	2500		V

Note: 4. a). Stresses beyond those listed under Absolute Maximum Ratings can cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods can affect device reliability.
b). Ratings apply to ambient temperature at +25°C. The JEDEC High-K board design used to derive this data is a 2inch × 2inch multi-layer board with 1oz internal power and ground planes and 2oz copper traces on the top and bottom of the board.

Recommended Operating Conditions

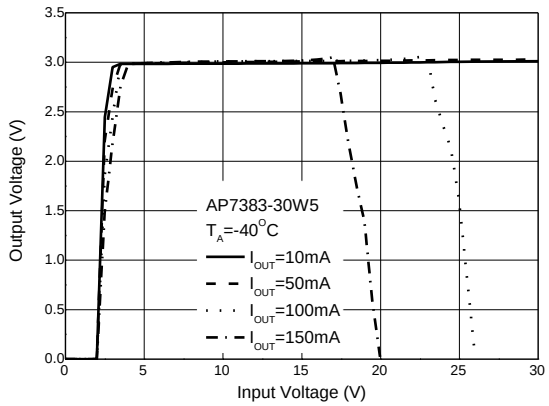
Symbol	Parameter	Min	Max	Unit
V_{IN}	Supply Input Voltage	3.5	30	V
T_J	Operating Junction Temperature	-40	+125	°C

Electrical Characteristics (@ V_{IN} = V_{OUT} + 2V, C_{IN} = 1.0µF, C_{OUT} = 1.0µF, Typical T_J = +25°C, unless otherwise specified.)

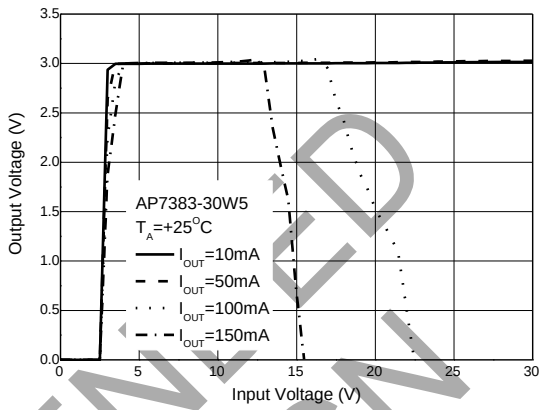
Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_{OUT}	Output Voltage	V_{IN} = V_{OUT} + 2V, I_{OUT} = 10mA Variation from Specified V_{OUT}		V_{OUT} × 99%	V_{OUT}	V_{OUT} × 101%	V
V_{IN}	Input Voltage	—		3.5	—	30	V
I_{LIMIT}	Current Limit	V_{IN} = V_{OUT} + 2V, V_{OUT1} = 98% × V_{OUT}		150	—	—	mA
$\Delta V_{OUT}/\Delta V_{IN}/V_{OUT}$	Line Regulation	V_{OUT} + 2V ≤ V_{IN} ≤ 30V, I_{OUT} = 10mA		—	0.05	—	%/V
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	V_{IN} = V_{OUT} + 2V, 1mA ≤ I_{OUT} ≤ 150mA		—	0.5	—	%
V_{DROP}	Dropout Voltage	3.0V ≤ V_{OUT} < 5.0V	I_{OUT} = 50mA	—	360	580	mV
			I_{OUT} = 100mA	—	750	1000	mV
			I_{OUT} = 150mA	—	1050	1500	mV
		V_{OUT} = 5.0V	I_{OUT} = 50mA	—	250	500	mV
			I_{OUT} = 100mA	—	550	750	mV
			I_{OUT} = 150mA	—	750	1100	mV
I_{GND}	Ground Current	I_{OUT} = 0A		—	1.8	3.0	µA
		I_{OUT} = 150mA		—	1.8	3.0	
I_{STD}	Standby Current	V_{EN} in OFF Mode		—	0.01	—	µA
$\Delta V_{OUT}/(V_{OUT}x\Delta T)$	Output Voltage Temperature Coefficient	I_{OUT} = 100µA, -40°C ≤ T_J ≤ +125°C		—	±100	—	ppm/°C
I_{EN}	EN Pin Current	—		—	1	—	µA
—	EN “High” Voltage	EN Input Voltage “High”		2.0	—	—	V
—	EN “Low” Voltage	EN Input Voltage “Low”		—	—	0.4	V
T_{OTSD}	Thermal Shutdown Temperature	—		—	+160	—	°C
T_{HYOTSD}	Thermal Shutdown Hysteresis	—		—	+20	—	°C

Performance Characteristics

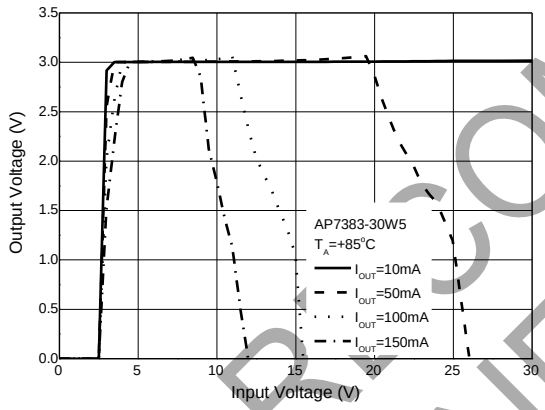
Output Voltage vs. Input Voltage @-40°C



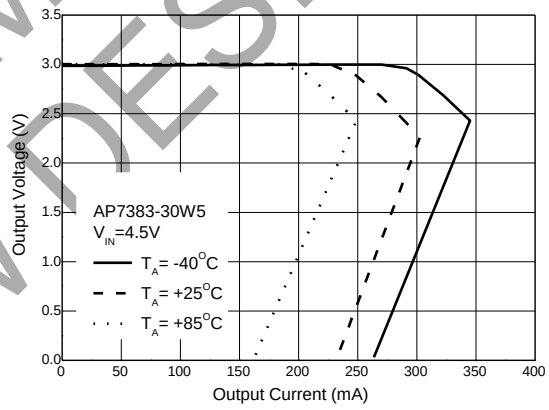
Output Voltage vs. Input Voltage @+25°C



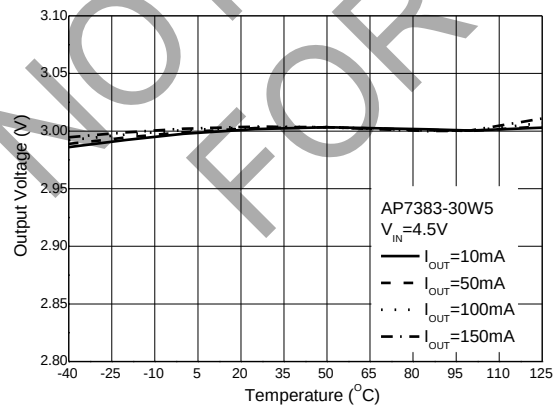
Output Voltage vs. Input Voltage @+85°C



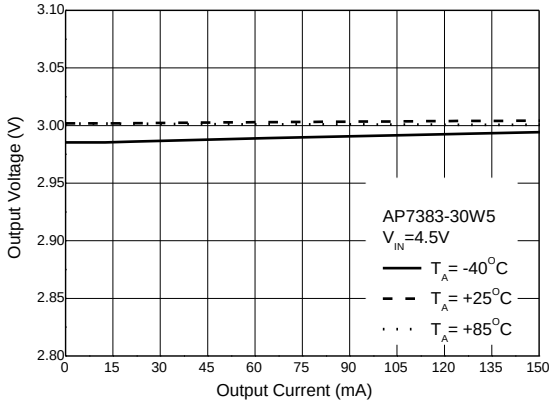
Output Voltage vs. Output Current



Output Voltage vs. Temperature

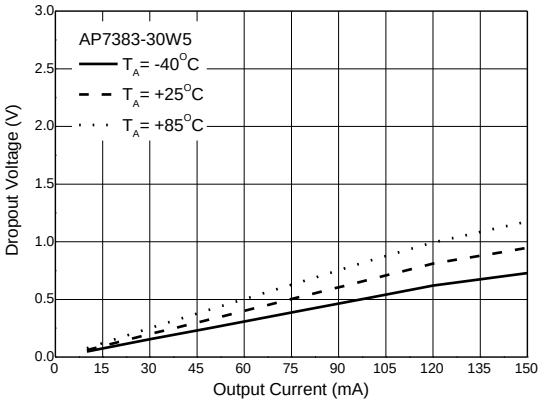


Output Voltage vs. Output Current

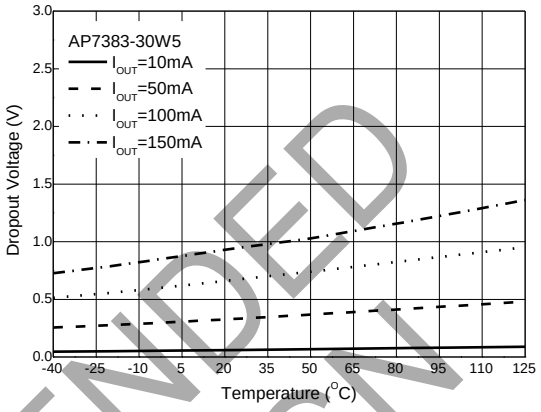


Performance Characteristics (continued)

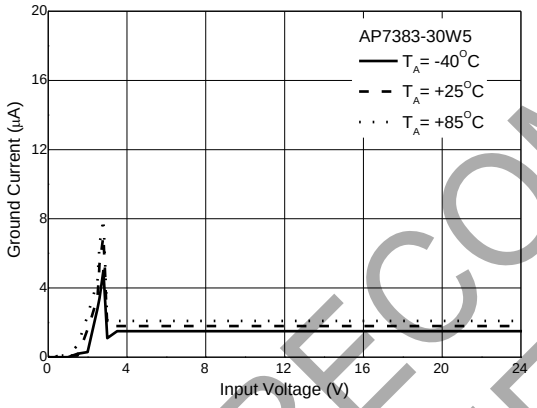
Dropout Voltage vs. Output Current



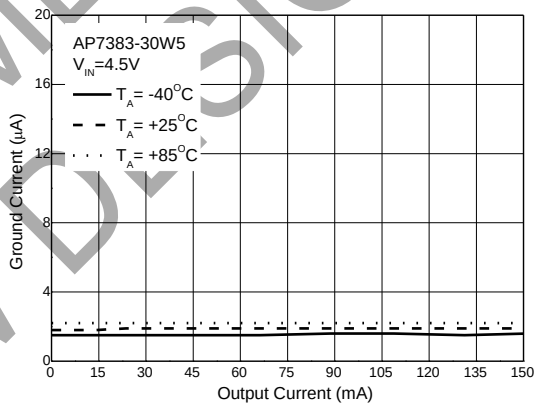
Dropout Voltage vs. Temperature



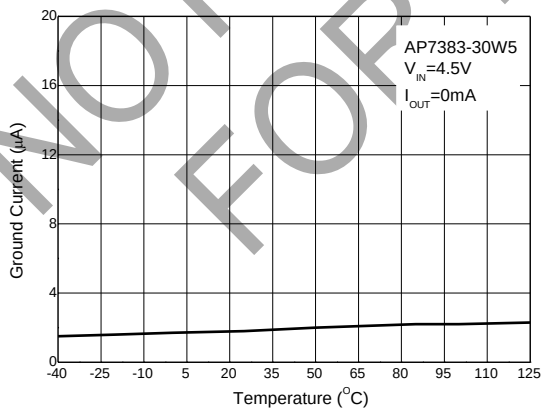
I_{GND} vs. Input Voltage



I_{GND} vs. Output Current

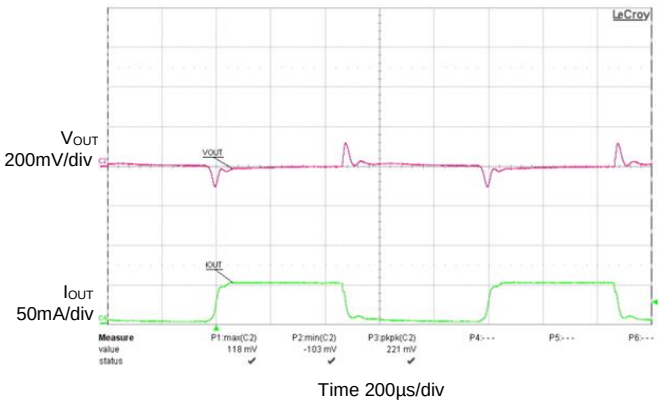


I_{GND} vs Temperature



Load Transient

C_{IN}=1µF, C_{OUT}=1µF, V_{IN}=V_{OUT}+1.5V to 30V, I_{OUT}=0 to 50mA



Ordering Information

AP7383 - XXX XXX - XX

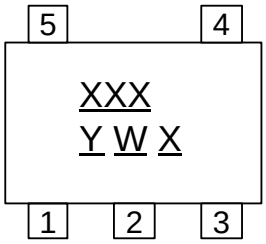
Output Voltage	Package	Packing
18 : 1.8V 30 : 3.0V 33 : 3.3V 345: 3.45V 36 : 3.6V 41 : 4.15V 44 : 4.4V 50 : 5.0V	W5/WR/WW : SOT25 Y : SOT89 FDC: U-DFN2020-6 (Type C)	7/13 : Tape & Reel

Part Number	Package Code	Package	Packing		Part Number Suffix
			Quantity	Carrier	
AP7383-XXW5-7	W5	SOT25	3000	Tape & Reel	-7
AP7383-XXWR-7	WR	SOT25	3000	Tape & Reel	-7
AP7383-XXWW-7	WW	SOT25	3000	Tape & Reel	-7
AP7383-XXY-13	Y	SOT89	2500	Tape & Reel	-13
AP7383-XXFDC-7	FDC	U-DFN2020-6 (Type C)	3000	Tape & Reel	-7

Marking Information

(1) SOT25

(Top View)



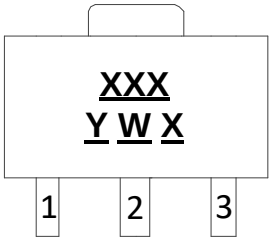
XXX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents
52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
AP7383-18W5-7	SOT25	F3A
AP7383-30W5-7	SOT25	F3B
AP7383-33W5-7	SOT25	F3C
AP7383-36W5-7	SOT25	F3D
AP7383-41W5-7	SOT25	F3E
AP7383-44W5-7	SOT25	F3F
AP7383-50W5-7	SOT25	F3G
AP7383-18WR-7	SOT25	F3H
AP7383-30WR-7	SOT25	F3J
AP7383-33WR-7	SOT25	F3K
AP7383-345WR-7	SOT25	F3Z
AP7383-36WR-7	SOT25	F3M
AP7383-41WR-7	SOT25	F3N
AP7383-44WR-7	SOT25	F3P
AP7383-50WR-7	SOT25	F3R
AP7383-18WW-7	SOT25	F3S
AP7383-30WW-7	SOT25	F3T
AP7383-33WW-7	SOT25	F3U
AP7383-36WW-7	SOT25	F3V
AP7383-41WW-7	SOT25	F3W
AP7383-44WW-7	SOT25	F3X
AP7383-50WW-7	SOT25	F3Y

Marking Information (continued)

(2) SOT89

(Top View)

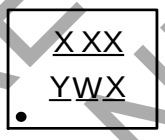


XXX : Identification code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : Internal code

Part Number	Package	Identification Code
AP7383-18Y-13	SOT89	F3A
AP7383-30Y-13	SOT89	F3B
AP7383-33Y-13	SOT89	F3C
AP7383-36Y-13	SOT89	F3D
AP7383-41Y-13	SOT89	F3E
AP7383-44Y-13	SOT89	F3F
AP7383-50Y-13	SOT89	F3G

(3) U-DFN2020-6 (Type C)

(Top View)



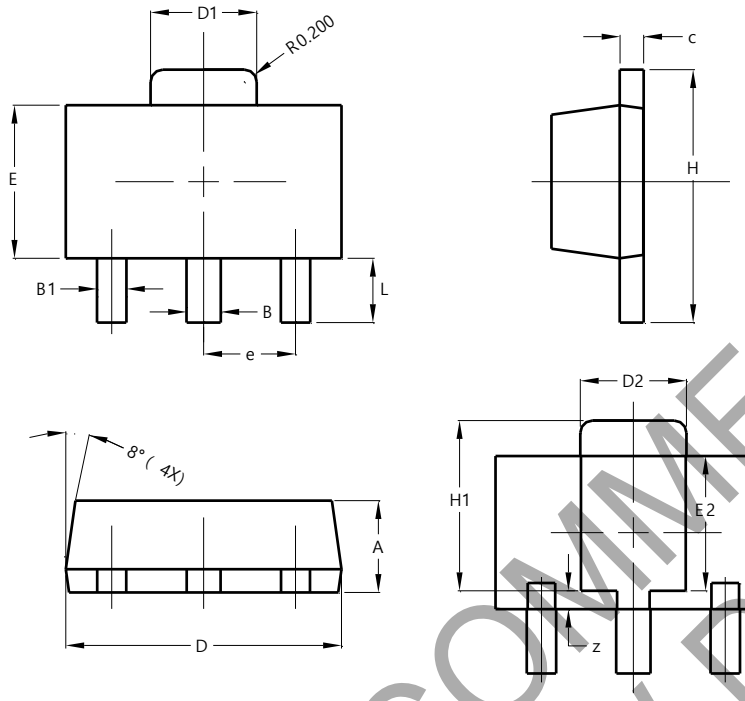
XXX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
AP7383-18FDC-7	U-DFN2020-6 (Type C)	F3A
AP7383-30FDC-7	U-DFN2020-6 (Type C)	F3B
AP7383-33FDC-7	U-DFN2020-6 (Type C)	F3C
AP7383-36FDC-7	U-DFN2020-6 (Type C)	F3D
AP7383-41FDC-7	U-DFN2020-6 (Type C)	F3E
AP7383-44FDC-7	U-DFN2020-6 (Type C)	F3F
AP7383-50FDC-7	U-DFN2020-6 (Type C)	F3G

Package Outline Dimensions

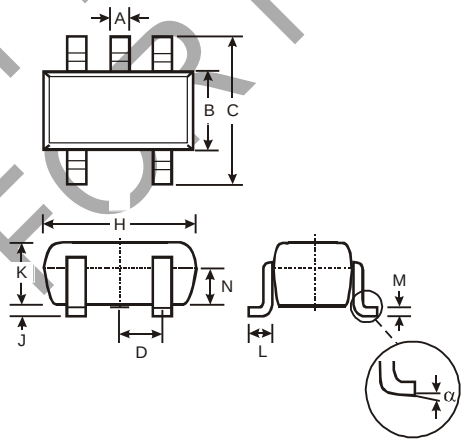
Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: SOT89



SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	—	—	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

(2) Package Type: SOT25

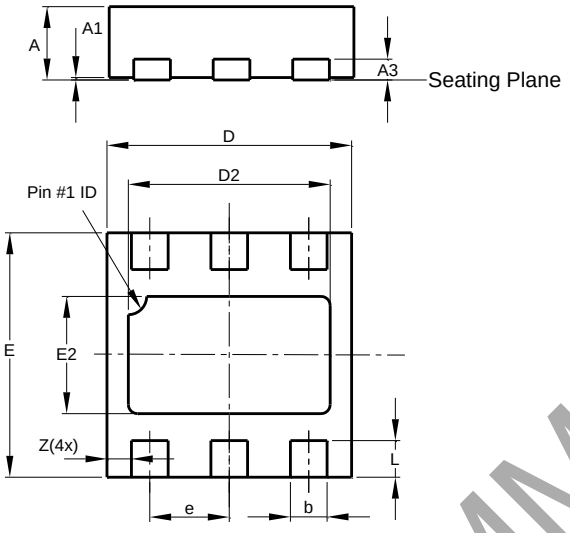


SOT25			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	—
All Dimensions in mm			

Package Outline Dimensions (continued)

Please see http://www.diodes.com/package-outlines.html for the latest version.

(3) Package Type: U-DFN2020-6 (Type C)

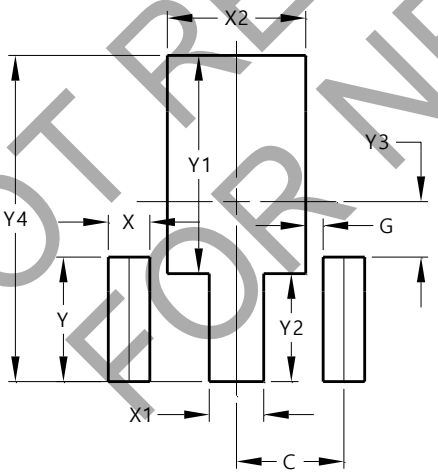


U-DFN2020-6 Type C			
Dim	**Min**	**Max**	**Typ**
A	0.57	0.63	0.60
A1	0.00	0.05	0.02
A3	—	—	0.15
b	0.25	0.35	0.30
D	1.95	2.075	2.00
D2	1.55	1.75	1.65
E	1.95	2.075	2.00
E2	0.86	1.06	0.96
e	—	—	0.65
L	0.25	0.35	0.30
Z	—	—	0.20
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: SOT89

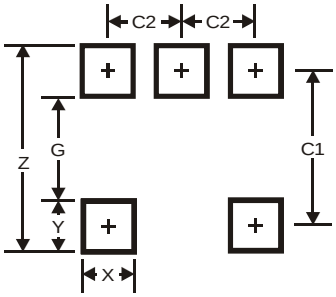


Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

Suggested Pad Layout (continued)

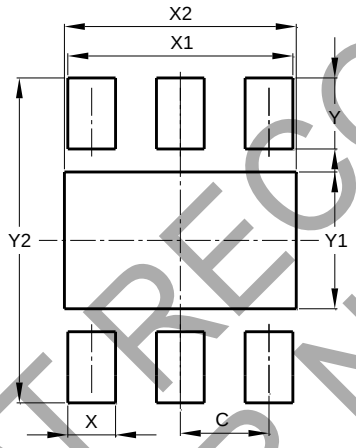
Please see http://www.diodes.com/package-outlines.html for the latest version.

(2) Package Type: SOT25



Dimensions	Value
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

(3) Package Type: U-DFN2020-6 (Type C)



Dimensions	Value (in mm)
C	0.650
X	0.350
X1	1.650
X2	1.700
Y	0.525
Y1	1.010
Y2	2.400

Mechanical Data

- Moisture Sensitivity:
  - SOT25/U-DFN2020-6 (Type C): Level 1 per J-STD-020
  - SOT89: Level 3 per J-STD-020
- Terminals:
  - SOT25/SOT89: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
  - U-DFN2020-6 (Type C): Finish NiPdAu over Copper Lead-Frame. Solderable per MIL-STD-202, Method 208 e4
- Weight:
  - SOT25: 0.016 grams (Approximate)
  - SOT89: 0.055 grams (Approximate)
  - U-DFN2020-6 (Type C): 0.007 grams (Approximate)

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