



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码



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Description

The NK-AP7383 series is a positive voltage regulator IC.

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

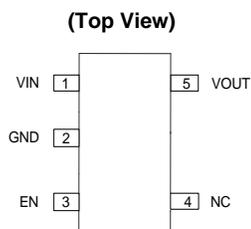
Features

- 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)**

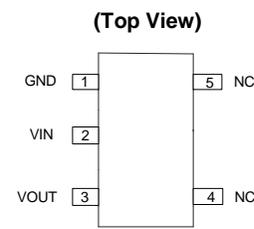
Applications

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

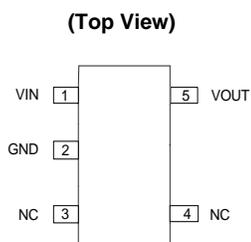
Pin Assignments



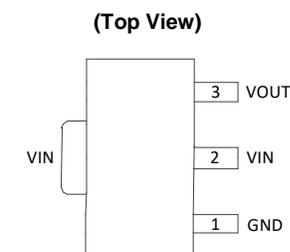
SOT25
(W5 Package)



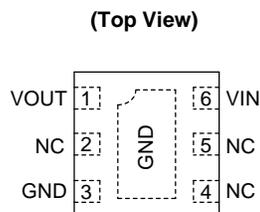
SOT25
(WR Package)



SOT25
(WW Package)

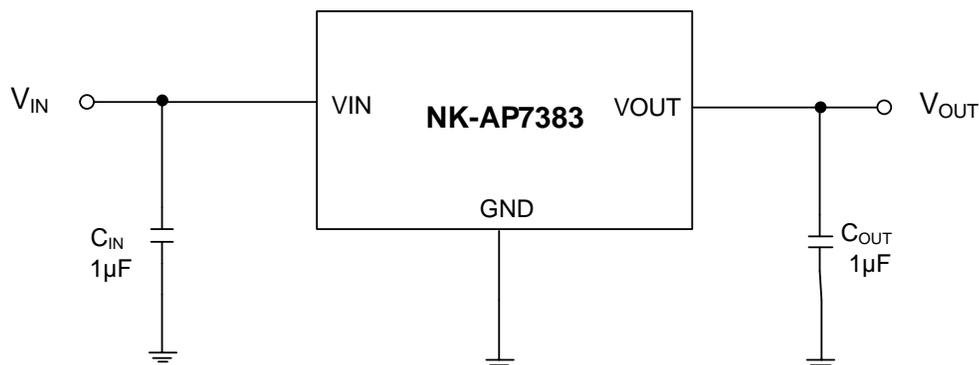


SOT89

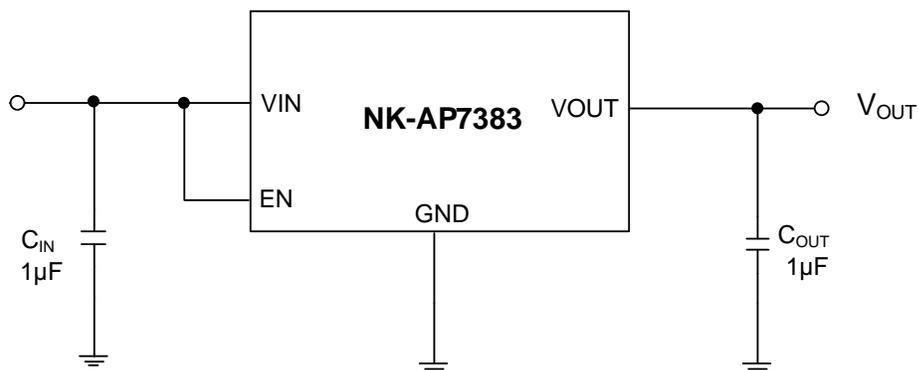


U-DFN2020-6 (Type C)

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) (@ $T_A = +25^\circ\text{C}$, 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		$^\circ\text{C}$
T_J	Operating Junction Temperature	+150		$^\circ\text{C}$
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	$^\circ\text{C/W}$
		SOT25 (WR Package)	166	
		SOT89	118	
		U-DFN2020-6 (Type C)	152	
θ_{JC}	Thermal Resistance (Junction to Case)	SOT25 (W5/WW Package)	68	$^\circ\text{C/W}$
		SOT25 (WR Package)	26	
		SOT89	20	
		U-DFN2020-6 (Type C)	58	
T_{STG}	Storage Temperature Range	-65 to +150		$^\circ\text{C}$
—	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 $+25^\circ\text{C}$. The JEDEC High-K board design used to derive this data is a 2inch x 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

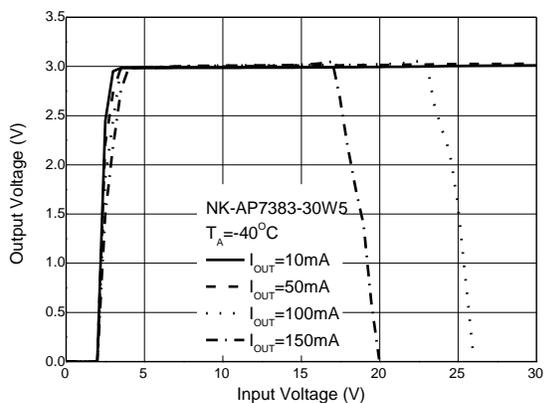
Symbol	Parameter	Min	Max	Unit
V_{IN}	Supply Input Voltage	3.5	30	V
T_J	Operating Junction Temperature	-40	+125	$^\circ\text{C}$

Electrical Characteristics (@ $V_{IN} = V_{OUT} + 2V$, $C_{IN} = 1.0\mu F$, $C_{OUT} = 1.0\mu F$, Typical $T_J = +25^\circ C$, unless otherwise specified.)

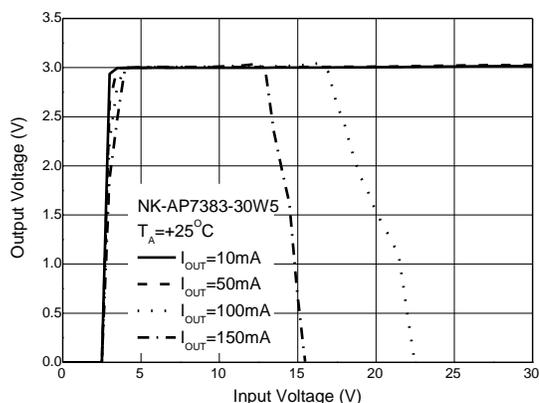
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit	
V_{OUT}	Output Voltage	$V_{IN} = V_{OUT} + 2V$, $I_{OUT} = 10mA$ Variation from Specified V_{OUT}	$V_{OUT} \times 99\%$	V_{OUT}	$V_{OUT} \times 101\%$	V	
V_{IN}	Input Voltage	—	3.5	—	30	V	
I_{LIMIT}	Current Limit	$V_{IN} = V_{OUT} + 2V$, $V_{OUT1} = 98\% \times V_{OUT}$	150	—	—	mA	
$\Delta V_{OUT}/\Delta V_{IN}/V_{OUT}$	Line Regulation	$V_{OUT} + 2V \leq V_{IN} \leq 30V$, $I_{OUT} = 10mA$	—	0.05	—	%/V	
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	$V_{IN} = V_{OUT} + 2V$, $1mA \leq I_{OUT} \leq 150mA$	—	0.5	—	%	
V_{DROP}	Dropout Voltage	$3.0V \leq V_{OUT} < 5.0V$	$I_{OUT} = 50mA$	—	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	
$\Delta V_{OUT}/(V_{OUT} \Delta T)$	Output Voltage Temperature Coefficient	$I_{OUT} = 100\mu A$, $-40^\circ C \leq T_J \leq +125^\circ C$	—	± 100	—	ppm/ $^\circ C$	
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	—	$^\circ C$	
T_{HYOTSD}	Thermal Shutdown Hysteresis	—	—	+20	—	$^\circ C$	

Performance Characteristics

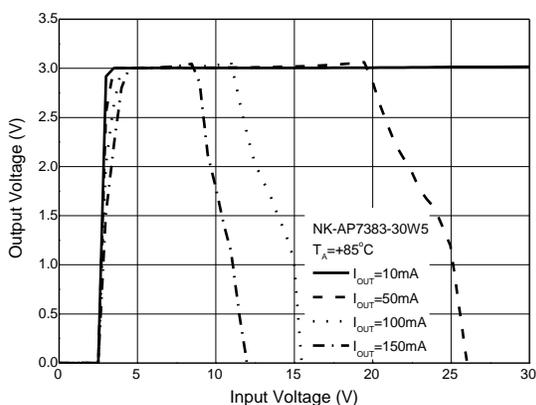
Output Voltage vs. Input Voltage @-40°C



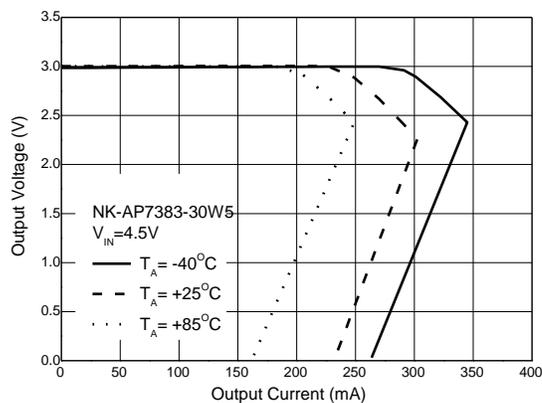
Output Voltage vs. Input Voltage @+25°C



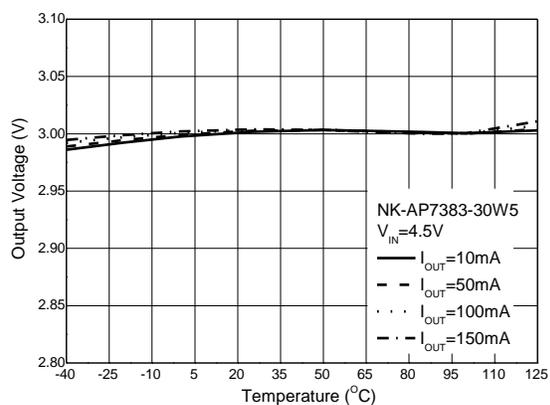
Output Voltage vs. Input Voltage @+85°C



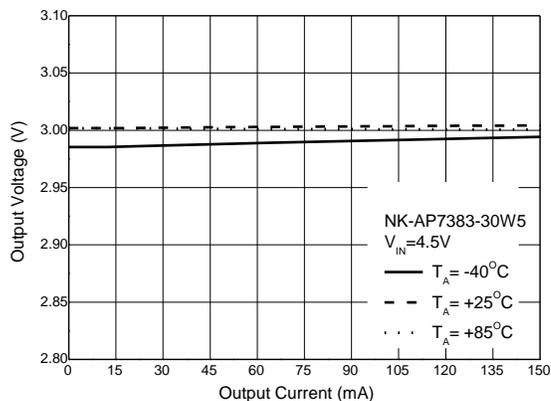
Output Voltage vs. Output Current



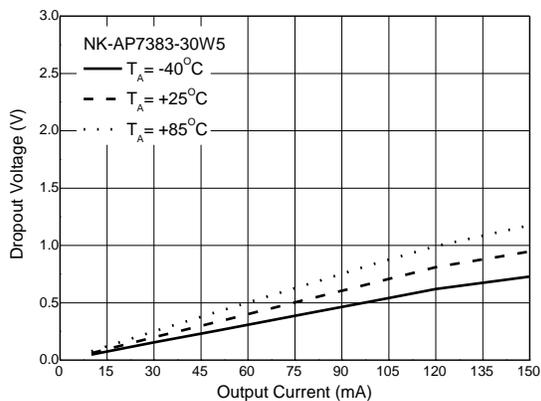
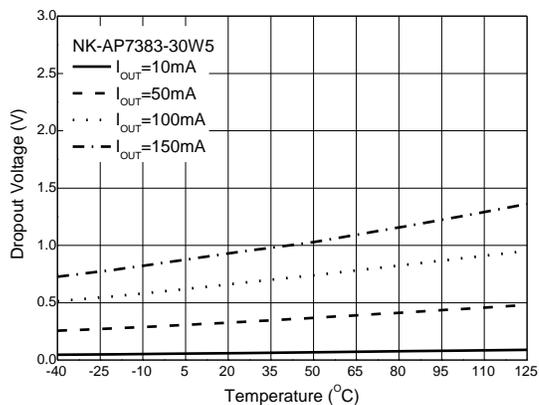
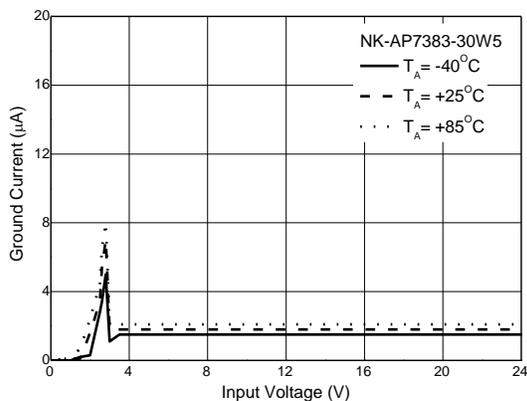
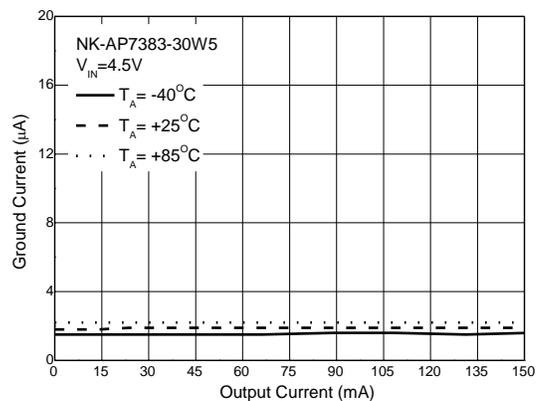
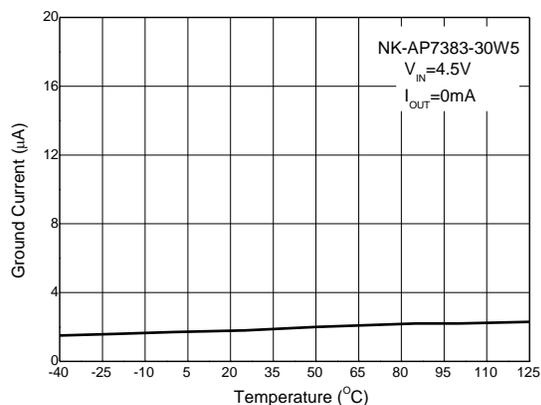
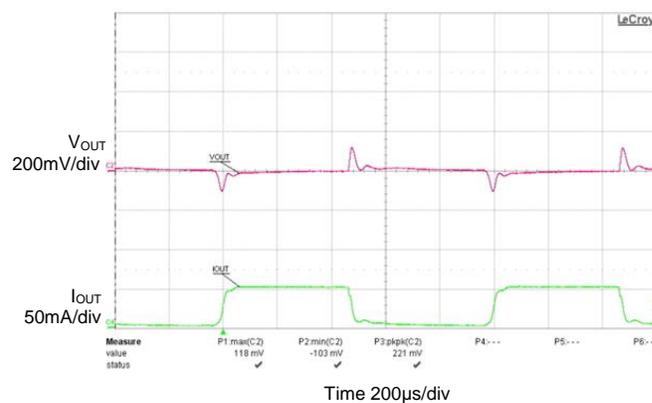
Output Voltage vs. Temperature



Output Voltage vs. Output Current

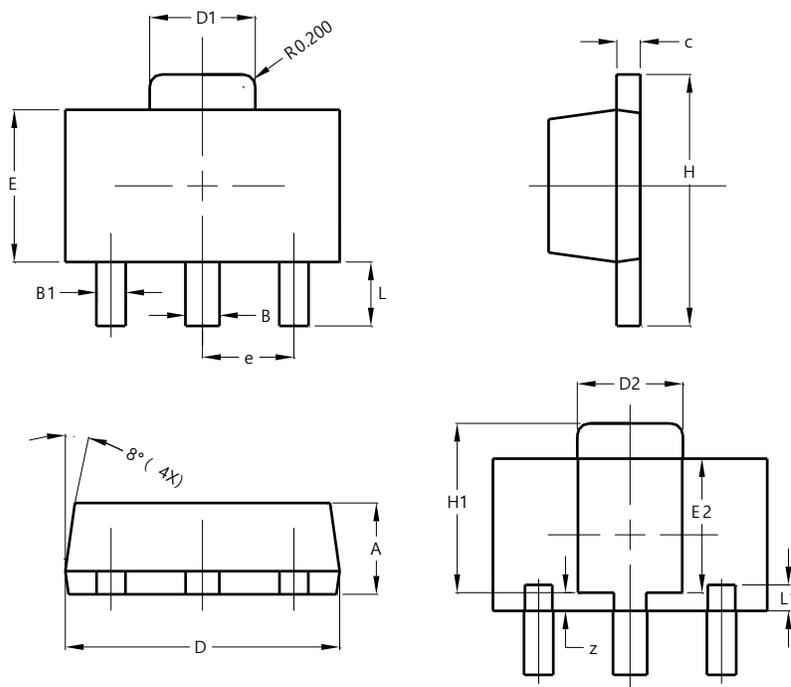


Performance Characteristics (continued)

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
 $C_{IN} = 1\mu\text{F}$, $C_{OUT} = 1\mu\text{F}$, $V_{IN} = V_{OUT} + 1.5\text{V to } 30\text{V}$, $I_{OUT} = 0 \text{ to } 50\text{mA}$


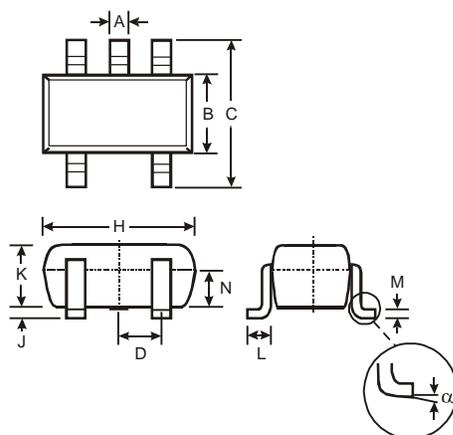
Package Outline Dimensions

(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			

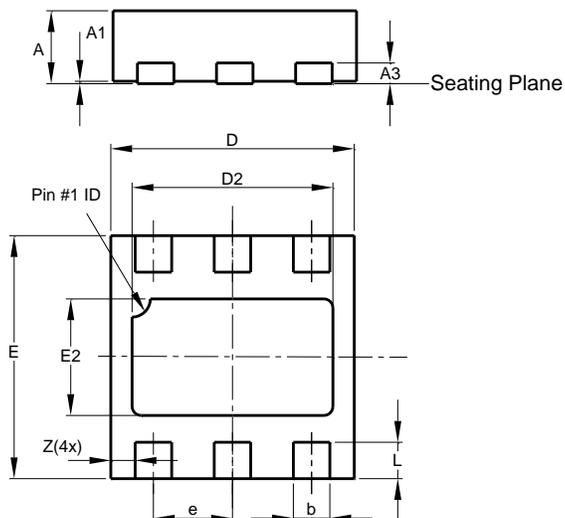
(2) Package Type: SOT25



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)

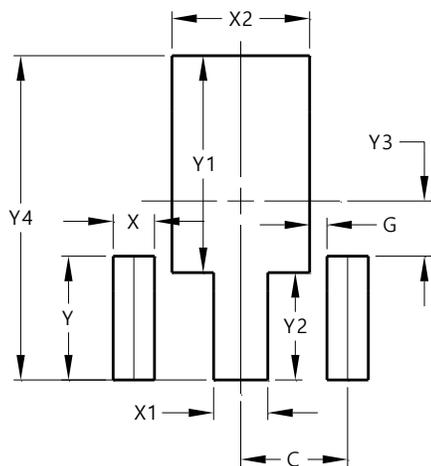
(3) Package Type: U-DFN2020-6 (Type C)



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

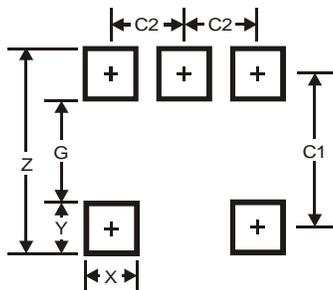
(1) Package Type: SOT89



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

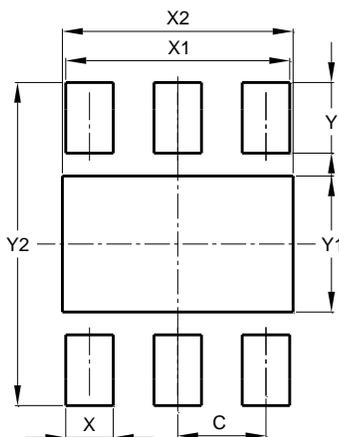
Suggested Pad Layout (continued)

(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 ③
 - U-DFN2020-6 (Type C): Finish NiPdAu over Copper Lead-Frame. Solderable per MIL-STD-202, Method 208 ④
- Weight:
 - SOT25: 0.016 grams (Approximate)
 - SOT89: 0.055 grams (Approximate)
 - U-DFN2020-6 (Type C): 0.007 grams (Approximate)