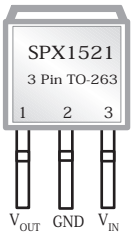
SPX1521

300mA Low Dropout Voltage Regulator

FEATURES

- 1% Output Accuracy 3.3V, 5V, at 300mA Output
- Very Low Quiescent Current
- 0.3V (Typ.) Dropout Voltage at 300mA
- Extremely Tight Load and Line Regulation
- Current & Thermal Limiting
- Reverse Battery Protection
- Equivalent Replacement For LT1521
- Available in RoHS Compliant, Lead Free Packages: TO-252, SOT-223, TO-220 & TO-263

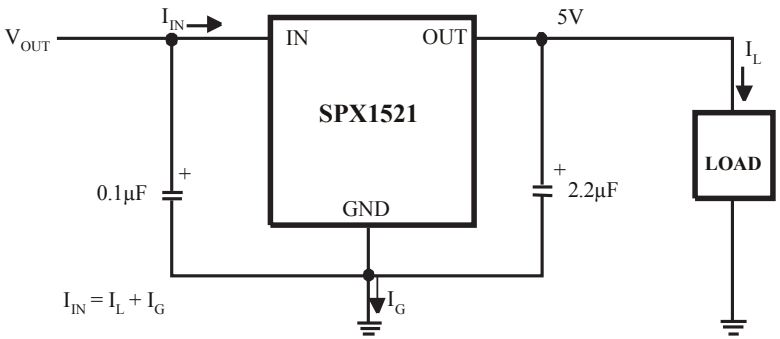


DESCRIPTION

The SPX1521 is a low power voltage regulator. This device is an excellent choice for use in battery-powered applications such as cordless telephones, radio control systems, and portable computers. The SPX1521 features very low quiescent current and very low dropout voltage. This includes a tight initial tolerance of ±1% max, and very low output temperature coefficient, making the SPX1521 useful as a low-power voltage reference.

The SPX1521 is offered in 3 pin TO-252, SOT-223, TO-220 & TO-263 packages.

TYPICAL APPLICATIONS CIRCUIT



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ABSOLUTE MAXIMUM RATINGS

Power Dissipation ..... Internally Limited
Lead Temp. (Soldering, 5 Seconds)..... 260°C
Storage Temperature Range..... -65°C to +150°C
Operating Junction Temperature Range ..... -40°C to +125°C
Input Supply Voltage..... -20V to +20V
Shutdown Input Voltage..... -0.6V to +6.5V
ESD Rating..... 2kV Min

ELECTRICAL CHARACTERISTICS

Electrical characteristics at V_{IN} = 6V, I_O = 1mA, C_{OUT} = 2.2µF, T_A= 25°C, unless otherwise specified.
Boldface applies over the full operating temperature range.

PARAMETER	CONDITIONS (Note 2)	TYP	MIN	MAX	UNITS
3.3V Version					
Output Voltage		3.3	3.267	3.333	V
	1mA ≤ I_L ≤ 300mA	**3.3**	**3.217**	**3.382**	
Reverse Output Current	V_{OUT}= 3.3V, V_{IN}= 0V	16		25	µA
5.0V Version					
Output Voltage		5.0	4.950	5.050	V
	1mA ≤ I_L ≤ 300mA	**5.0**	**4.880**	**5.120**	
Reverse Output Current	V_{OUT}= 5.0V, V_{IN}= 0V	16		25	µA
All Voltage Options					
Output Voltage Temperature Coefficient	(Note1)	20		**100**	ppm/°C
Line Regulation	6V ≤ V_{IN} ≤ 20V (Note 4)	1.5		**20**	mV
Load Regulation (Note 3)	I_L=1 to 300mA	4		20 **30**	mV
Dropout Voltage (Note 5)	I_L=1mA	0.13		0.17 **0.25**	V
	I_L=300mA	0.30		0.55 **0.70**	
Ground Current	I_L=1mA	**100**		**150**	µA
	I_L=10mA	**350**		**500**	
	I_L=50mA	**1.5**		**3**	mA
	I_L=100mA	**2**		**6**	
	I_L=300mA	**5**		**14**	
Current Limit	V_{OUT}=0	330		**500**	mA
Ripple Rejection	V_{IN} -V_{OUT}=1V(Avg), V_{RIPPLE}=0.5Vp-p, F_{RIPPLE}=120Hz, I_{LOAD}=150mA	58	50		dB
Input Reverse Leakage Current	V_{IN}= -20V, V_{OUT}=0V			**1.0**	mA

Note 1: Output or reference voltage temperature coefficients defined as the worst case voltage change divided by the total temperature range.
Note 2: Unless otherwise specified all limits are guaranteed for T_j = 25°C, V_{IN} = 6V, I_L = 1mA and C_L = 2.2µF.
Note 3: Regulation is measured at constant junction temperature, using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.
Note 4: Line regulation for the SPX1521 is tested at 25°C for I_L = 1 mA. For T_J = 125°C, line regulation is guaranteed by design.
Note 5: Dropout voltage is defined as the input to output differential at which the output voltage drops 100 mV below its nominal value measured at 1V differential.

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External Capacitors

The stability of the SPX1521 requires a 2.2µF or greater capacitor between output and ground. Oscillation could occur without this capacitor. Most types of tantalum or aluminum electrolytic works fine here. For operations of below -25°C solid tantalum is recommended since the many aluminum types have electrolytes that freeze at about -30°C. The ESR of about 5Ω or less and resonant frequency above 500kHz are the most important parameters in the value of the capacitor. The capacitor value can be increased without limit.

The SPX1521, unlike other low dropout regulators will remain stable and in regulation with no load in addition to the internal voltage divider. This feature is especially important in applications like CMOS RAM keep-alive.

If there is more than 10 inches of wire between the input and the AC filter capacitor, or if a battery is used as the input, then a 0.1µF tantalum or aluminum electrolytic capacitor should be placed from the input to the ground.

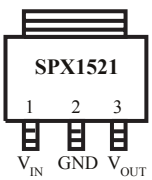
Reducing Output Noise

It may be an advantage to reduce the AC noise present at the output. One way is to reduce the regulator bandwidth by increasing the size of the output capacitor. Increasing the capacitor from 1µF to 220µF only decreases the noise from 430µV to 160µVrms for a 100kHz bandwidth at 5V output.

PINOUTS

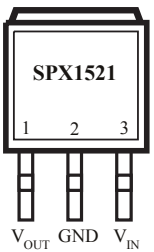
Note: Tab is connected to GND

SOT-223 (M3)



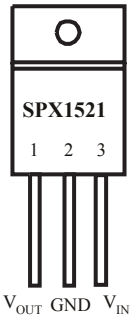
Top View

TO-263-3 (T)



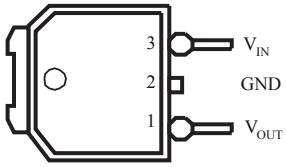
Top View

TO-220-3 (U)



Front View

TO-252 (R)



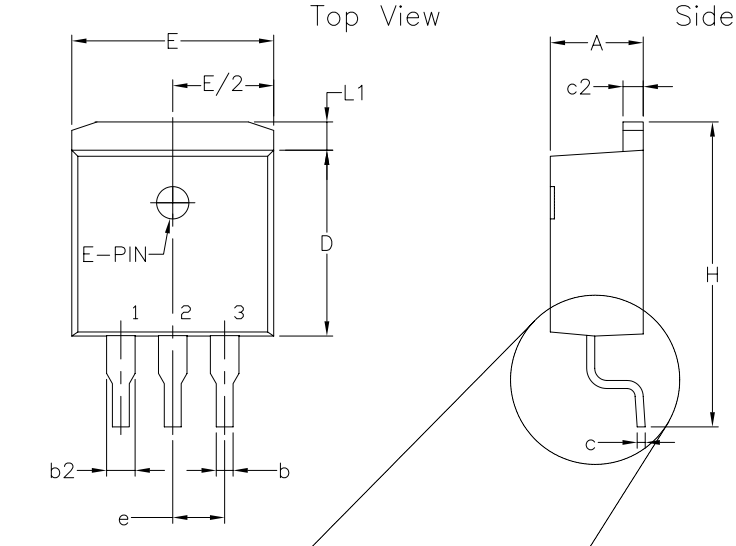
Front View

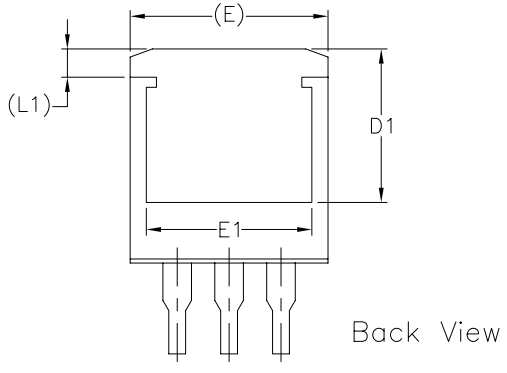
Thermal Resistance (Theta JA)

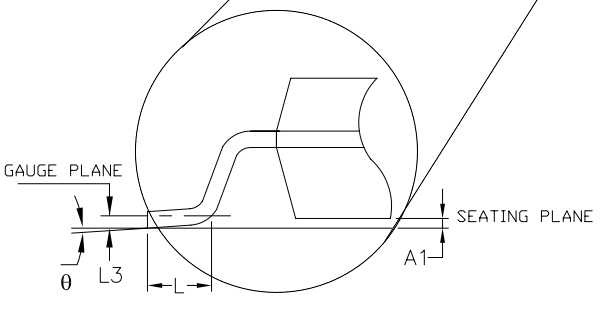
SOT-223 ------62.3ºC/W
TO-262 ------31.4ºC/W
TO-220 ------29.4ºC/W
TO-252 ------50.0ºC/W

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REVISION HISTORY			
REV.	DISCRIPTION	DATE	APP'D
A	DRAWING ORIGINATION	08/05/05	JL
B	DRAWING FORMAT MODIFICATION	09/12/06	JL





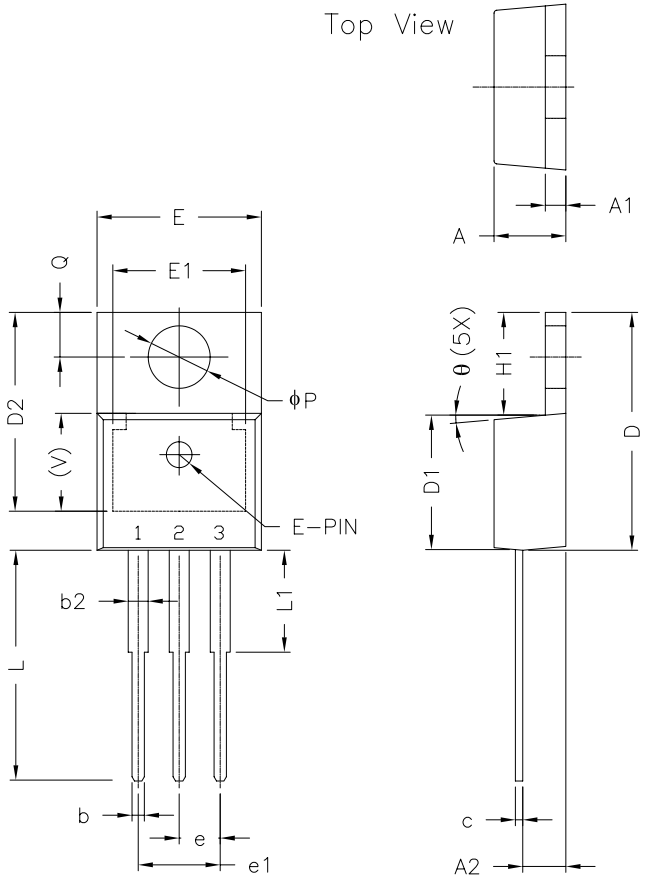


3 Pin TO-263 JEDEC TO-263 Variation AA						
SYMBOLS	DIMENSIONS IN INCH (Control Unit)			DIMENSIONS IN MM (Reference Unit)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.160	—	0.190	4.06	—	4.83
A1	0.000	—	0.010	0.00	—	0.25
b	0.020	—	0.039	0.51	—	0.99
b2	0.045	—	0.070	1.14	—	1.78
c	0.015	—	0.029	0.38	—	0.74
c2	0.045	—	0.065	1.14	—	1.65
D	0.330	—	0.380	8.38	—	9.65
D1	0.270	—	—	6.86	—	—
E	0.380	—	0.420	9.65	—	10.67
E1	0.245	—	—	6.22	—	—
e	0.100 BSC			2.54 BSC		
H	0.575	—	0.625	14.61	—	15.88
L	0.070	—	0.110	1.78	—	2.79
L1	—	—	0.066	—	—	1.68
L3	0.010 BSC			0.25 BSC		
θ	0°		8°	0°		8°
N	3			3		

Solved by Sipex	SIPEX CORPORATION		
	3 PIN TO-263 PACKAGE OUTLINE		
Packaging Approval:	Drawing No:	3-PIN TO-263	
By: JL Date: 09/12/06	Revision: B	Sheet: 1 OF 1	

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REVISION HISTORY			
REV.	DISCRIPTION	DATE	APP'D
A	DRAWING ORIGINATION	08/04/05	JL
B	DRAWING FORMAT MODIFICATION	05/25/06	JL



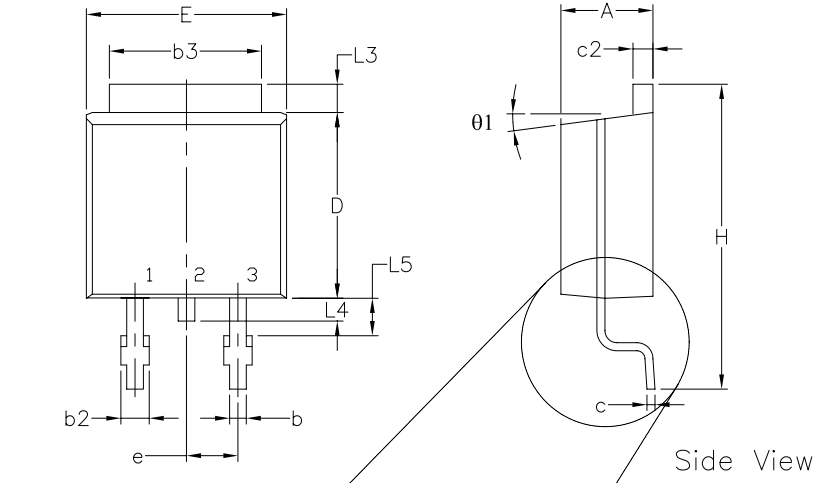
3 Pin TO-220 (Option 1)* JEDEC TO-220-AB				
SYMBOLS	DIMENSIONS IN INCH (Control Unit)		DIMENSIONS IN MM (Reference Unit)	
	MIN	MAX	MIN	MAX
A	0.140	0.190	3.56	4.82
A1	0.020	0.055	0.51	1.40
A2	0.080	0.115	2.03	2.92
b	0.015	0.040	0.38	1.02
c	0.014	0.024	0.36	0.61
D	0.560	0.650	14.22	16.51
D1	0.330	0.355	8.38	9.02
D2	0.480	0.507	12.19	12.88
E	0.380	0.420	9.65	10.67
E1	0.270	0.350	6.86	8.89
e	0.100 BSC		2.54 BSC	
e1	0.200 BSC		5.08 BSC	
H1	0.230	0.270	5.84	6.86
L	0.500	0.580	12.70	14.73
L1	—	0.250	—	6.35
P	0.139	0.156	3.53	3.96
Q	0.103	0.113	2.62	2.87
V	0.240 REF		6.10 REF	
θ	3°	7°	3°	7°
N	3		3	

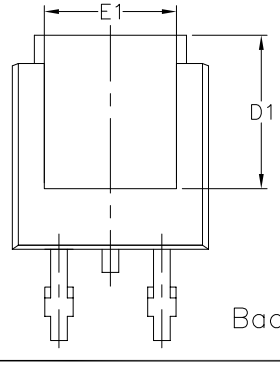
* Refer to product datasheet for POD option being used

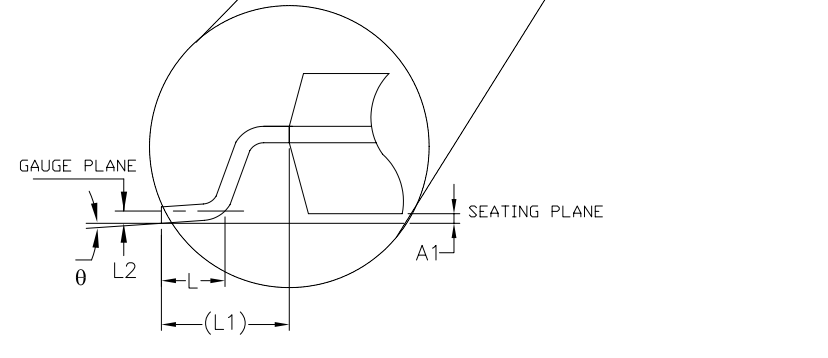
Solved by Sipex	SIPEX CORPORATION		
	3 PIN TO-220 PACKAGE OUTLINE		
Packaging Approval:	Drawing No:	3-PIN TO-220	
By: JL / Date: 05/25/06	Revision: B	Sheet: 1 OF 2	

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REVISION HISTORY			
REV.	DISCRIPTION	DATE	APP'D
A	DRAWING ORIGINATION	08/04/05	JL
B	DRAWING FORMAT MODIFICATION	09/14/06	JL







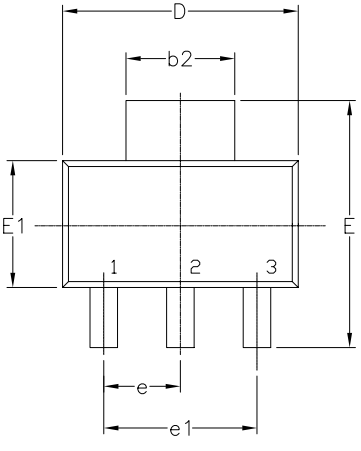
3 Pin TO-252 JEDEC TO-252 Variation AA						
SYMBOLS	DIMENSIONS IN INCH (Control Unit)			DIMENSIONS IN MM (Reference Unit)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.086	—	0.094	2.18	—	2.39
A1	—	—	0.005	—	—	0.13
b	0.025	—	0.035	0.64	—	0.89
b2	0.030	—	0.045	0.76	—	1.14
b3	0.195	—	0.215	4.95	—	5.46
c	0.018	—	0.024	0.46	—	0.61
c2	0.018	—	0.035	0.46	—	0.89
D	0.235	0.240	0.245	5.97	6.10	6.22
D1	0.205	—	—	5.21	—	—
E	0.250	—	0.265	6.35	—	6.73
E1	0.170	—	—	4.32	—	—
e	0.090 BSC			2.29 BSC		
H	0.370	—	0.410	9.40	—	10.41
L	0.055	0.060	0.070	1.40	1.52	1.78
L1	0.108 REF			2.74 REF		
L2	0.020 BSC			0.51 BSC		
L3	0.035	—	0.050	0.89	—	1.27
L4	—	—	0.040	—	—	1.02
L5	0.045	—	0.060	1.14	—	1.52
θ	0°		10°	0°		10°
θ1	0°		15°	0°		15°
N	3			3		

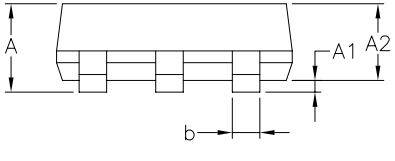
Solved by Sipex	SIPEX CORPORATION		
	3 PIN TO-252 PACKAGE OUTLINE		
Packaging Approval:	Drawing No: 3-PIN TO-252		
By: JL / Date: 09/14/06	Revision: B	Sheet: 1 OF 1	

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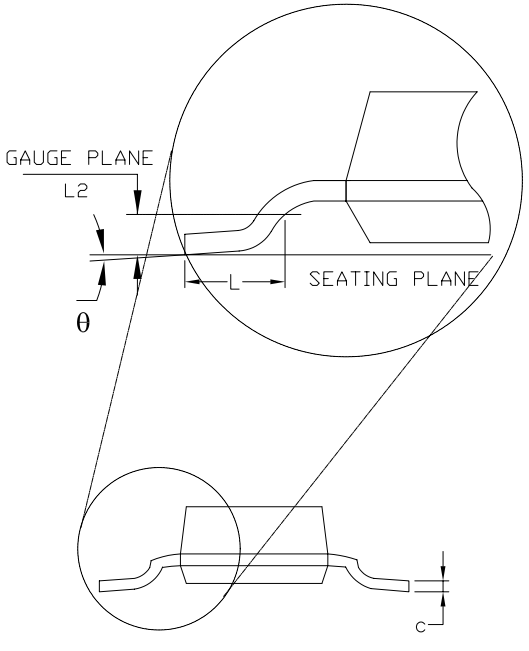
REVISION HISTORY			
REV.	DISCRIPTION	DATE	APP'D
A	DRAWING ORIGINATION	08/08/05	JL
B	DRAWING FORMAT MODIFICATION	09/11/06	JL

Top View





Side View



Front View

3 Pin SOT-223 JEDEC TO-261 Variation AA						
SYMBOLS	DIMENSIONS IN MM (Control Unit)			DIMENSIONS IN INCH (Reference Unit)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	—	—	1.80	—	—	0.071
A1	0.02	—	0.10	0.001	—	0.004
A2	1.50	1.60	1.70	0.060	0.063	0.067
b	0.66	0.76	0.84	0.026	0.030	0.033
b2	2.90	3.00	3.10	0.114	0.118	0.122
c	0.23	0.30	0.35	0.010	0.012	0.014
D	6.30	6.50	6.70	0.248	0.256	0.264
E	6.70	7.00	7.30	0.264	0.276	0.287
E1	3.30	3.50	3.70	0.130	0.138	0.146
e	2.30 BSC			0.091 BSC		
e1	4.60 BSC			0.182 BSC		
L	0.75	—	—	0.030	—	—
L2	0.25 BSC			0.010 BSC		
θ	0°	—	10°	0°	—	10°
N	3			3		

Solved by Sipex		SIPEX CORPORATION	
		3 PIN SOT-223 PACKAGE OUTLINE	
Packaging Approval:		Drawing No:	3-PIN SOT-223
By: JL	Date: 09/11/06	Revision: B	Sheet: 1 OF 1

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Part Number	Package Code	RoHS	Status	Pack Type	Pack Qty
SPX1521M3-L-3-3	SOT-223-3	▪	Active	Tube	78
SPX1521M3-L-5-0	SOT-223-3	▪	Active	Tube	78
SPX1521M3-L-5-0/TR	SOT-223-3	▪	Active	Tape & Reel	2500
SPX1521R-3-3	TO-252		EOL	Tube	77
SPX1521T-L-5-0	TO-263-3	▪	EOL	Tube	50
SPX1521R-3-3/TR	TO-252		OBS	Tape & Reel	2500
SPX1521R-5-0	TO-252		OBS	Tube	77
SPX1521R-5-0/TR	TO-252		OBS	Tape & Reel	2500
SPX1521R-L-3-3	TO-252	▪	OBS	Tube	77
SPX1521R-L-3-3/TR	TO-252	▪	OBS	Tape & Reel	2500
SPX1521R-L-5-0	TO-252	▪	OBS	Tube	77
SPX1521R-L-5-0/TR	TO-252	▪	OBS	Tape & Reel	2500
SPX1521T-3-3	TO-263-3		OBS	Tube	50
SPX1521T-3-3/TR	TO-263-3		OBS	Tape & Reel	500
SPX1521T-5-0	TO-263-3		OBS	Tube	50
SPX1521T-5-0/TR	TO-263-3		OBS	Tape & Reel	500
SPX1521T-L-3-3	TO-263-3	▪	OBS	Tube	50
SPX1521T-L-3-3/TR	TO-263-3	▪	OBS	Tape & Reel	500
SPX1521T-L-5-0/TR	TO-263-3	▪	OBS	Tape & Reel	500
SPX1521U-3-3	TO-220-3		OBS	Tube	50
SPX1521U-5-0	TO-220-3		OBS	Tube	50
SPX1521U-L-3-3	TO-220-3	▪	OBS	Tube	50
SPX1521U-L-5-0	TO-220-3	▪	OBS	Tube	50

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