

FAN1616A

0.5A Adjustable/Fixed Low Dropout Linear Regulator

Features

- Low dropout voltage
- Load regulation: 0.05% typical
- · Current limit
- On-chip thermal limiting
- Standard SOT-223 and TO-252 packages
- Three-terminal adjustable or fixed 1.8V, 2.5V, 3.3V or 5V
- Specified from -40°C to +125°C

Applications

- · USB Controlled Power Supply
- High efficiency linear regulators for Mixed Voltage Logic, ASIC, FPGA based systems
- · Post regulators for switching supplies
- · Battery chargers
- 12V to 5V, 3.3V, 2.5V, 1.8V, or adj linear regulators
- · Motherboard clock supplies
- SDRAM Module supplies

Description

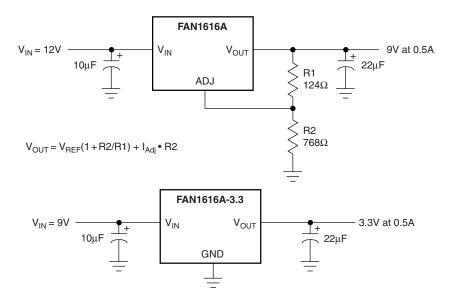
The FAN1616A, FAN1616A-1.8, -2.5, -3.3 and -5 are low dropout three-terminal regulators with 0.5A output current capability. These devices have been optimized for applications where transient response and minimum dropout voltage are critical. The 5V version is designed also to be used in USB Hub and Motherboard applications.

On-chip thermal limiting provides protection against any combination of overload and ambient temperature that would create excessive junction temperatures.

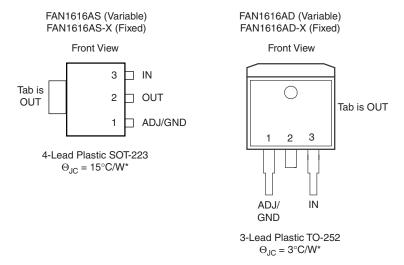
Unlike PNP type regulators where up to 10% of the output current is wasted as quiescent current, the bias current of the FAN1616A flows into the load, increasing efficiency.

The FAN1616A series regulators are available in the industry-standard SOT-223 and TO-252 power packages.

Typical Applications



Pin Assignments



*With package soldered to 0.5 square inch copper area over backside ground plane or internal power plane, Θ_{JA} can vary from 30°C/W to >50°C/W. Other mounting techniques may provide better power dissipation than 30°C/W.

Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
V _{IN}		18	V
(V _{IN} –V _{OUT}) * I _{OUT}		See Figure 1	
Operating Junction Temperature Range	-40	125	°C
Storage Temperature Range	-65	150	°C
Lead Temperature (Soldering, 10 sec.)		300	°C

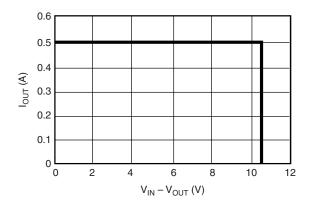


Figure 1. Absolute Maximum Safe Operating Area

FAN1616A PRODUCT SPECIFICATION

Electrical Characteristics

Operating Conditions: $V_{IN} \le 12V$, $T_J = 25^{\circ}C$ unless otherwise specified.

The • denotes specifications which apply over the specified operating temperature range.

Parameter	Conditions		Min.	Тур.	Max.	Units
Reference Voltage ³	$1.5V \le (V_{IN} - V_{OUT}) \le 5.75V,$ $10mA \le I_{OUT} \le 0.5A$	•	1.225 (-2%)	1.250	1.275 (+2%)	V
Output Voltage ⁴	$\begin{array}{l} 10\text{mA} \leq I_{OUT} \leq 0.5\text{A} \\ \text{FAN1616A-1.8, } 3.3\text{V} \leq \text{V}_{IN} \leq 12\text{V} \\ \text{FAN1616A-2.5, } 4.0\text{V} \leq \text{V}_{IN} \leq 12\text{V} \\ \text{FAN1616A-3.3, } 4.5\text{V} \leq \text{V}_{IN} \leq 12\text{V} \\ \text{FAN1616A-5, } 6.2\text{V} \leq \text{V}_{IN} \leq 12\text{V} \end{array}$	•	1.764 2.450 3.234 4.900	1.800 2.500 3.300 5.000	1.836 2.550 3.366 5.100	V V V
Line Regulation ^{1,2}	$(V_{OUT} + 1.5V) \le V_{IN} \le 12V, I_{OUT} = 10mA$	•		0.005	0.2	%
Load Regulation ^{1,2,3}	$(V_{IN} - V_{OUT}) = 2V, 10mA \le I_{OUT} \le 0.5A$	•		0.05	0.5	%
Dropout Voltage	$\Delta V_{REF} = 1\%$, $I_{OUT} = 0.5A$	•		1.000	1.200	V
Adjust Pin Current ³		•		35	120	μΑ
Adjust Pin Current Change ^{3, 4}	$1.5V \le (V_{IN} - V_{OUT}) \le 12V,$ $10mA \le I_{OUT} \le 0.5A$	•		0.2	5	μА
Minimum Load Current	$1.5V \le (V_{IN} - V_{OUT}) \le 12V$	•	10			mA
Quiescent Current	V _{IN} = V _{OUT} + 1.25V	•		4	13	mA
Ripple Rejection	$f = 120$ Hz, $C_{OUT} = 22\mu F$ Tantalum, $(V_{IN} - V_{OUT}) = 3V$, $I_{OUT} = 0.5$ A		60	72		dB
Thermal Regulation	T _A = 25°C, 30ms pulse			0.004	0.02	%/W
Temperature Stability		•		0.5		%
Long-Term Stability	T _A = 125°C, 1000hrs.			0.03	1.0	%
RMS Output Noise (% of V _{OUT})	$T_A = 25^{\circ}C$, $10Hz \le f \le 10kHz$			0.003		%
Thermal Resistance,	SOT-223			15		°C/W
Juncation to Case	TO-252			3		°C/W
Thermal Shutdown				150		°C

Notes:

- 1. See thermal regulation specifications for changes in output voltage due to heating effects. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
- 2. Line and load regulation are guaranteed up to the maximum power dissipation. Power dissipation is determined by input/output differential and the output current. Guaranteed maximum output power will not be available over the full input/output voltage range.
- 3. FAN1616A only.
- 4. Output current must be limited to meet the absolute maximum ratings of the part.

Typical Performance Characteristics

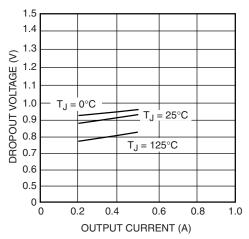


Figure 2. Dropout Voltage vs. Output Current

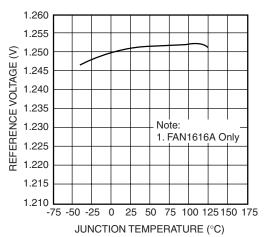


Figure 4. Reference Voltage vs. Temperature

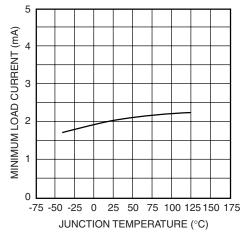


Figure 6. Minimum Load Current vs. Temperature

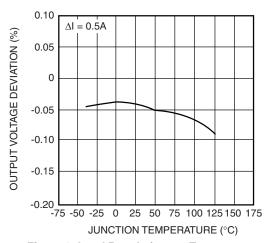


Figure 3. Load Regulation vs. Temperature

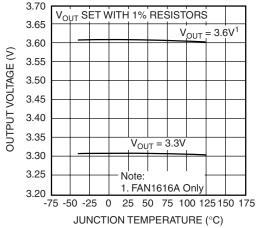


Figure 5. Output Voltage vs. Temperature

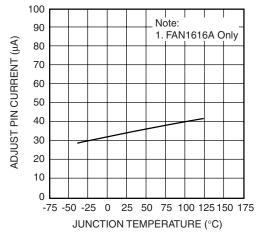


Figure 7. Adjust Pin Current vs. Temperature

FAN1616A PRODUCT SPECIFICATION

Typical Performance Characteristics (continued)

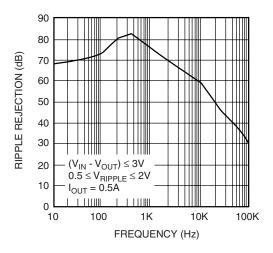


Figure 8. Ripple Rejection vs. Frequency

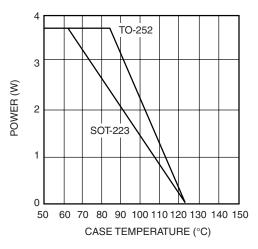


Figure 9. Maximum Power Dissipation

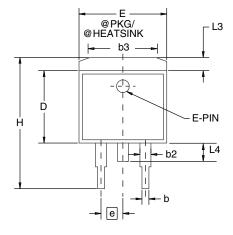
Mechanical Dimensions

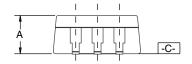
3-Lead TO-252 Package

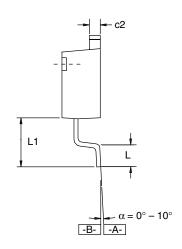
Symbol	Inc	hes	Millim	neters	Notes
Syllibol	Min.	Max.	Min.	Max.	Notes
Α	.086	.094	2.19	2.39	
b	.025	.035	0.64	0.89	
b2	.030	.045	0.76	1.14	
b3	.205	.215	5.21	5.46	4
С	.018	.018 .024		0.61	
c2	.018	.023	0.46	0.58	
D	.210	.245	5.33	6.22	1
Е	.250	.265	6.35	6.73	1
е	.090	BSC	2.29 BSC		
Н	.370	.410	9.40	10.41	
L	.055 .070		1.40	1.78	3
L1	.108 REF		2.74 REF		·
L3	.035	.080	0.89	2.03	4
L4	.025	.040	0.64	1.02	

Notes:

- Dimensions are exclusive of mold flash, metal burrs or interlead protrusion.
- 2. Stand off-height is measured from lead tip with ref. to Datum -B-.
- 3. Foot length is measured with ref. to Datum -A- with lead surface.
- 4. Thermal pad contour optional within dimension b3 and L3.
- Formed leads to be planar with respect to one another at seating place -C-.
- 6. Dimensions and tolerances per ASME Y14.5M-1994.





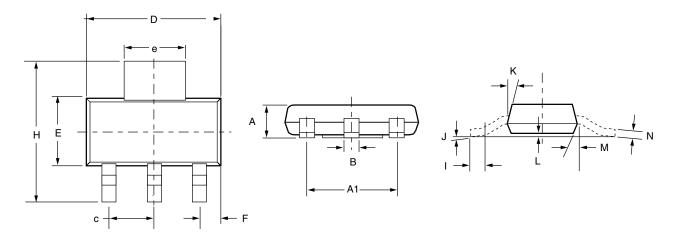


FAN1616A PRODUCT SPECIFICATION

Mechanical Dimensions

4-Lead SOT-223 Package

Symbol	Inc	hes	Millin	neters	Notes
	Min.	Max.	Min.	Max.	Notes
Α	_	.071	_	1.80	
A1	-	.181	_	4.80	
В	.025	.033	.640	.840	
С		.090	_	2.29	
D	.248	.264	6.30	6.71	
E	.130	.148	3.30	3.71	
е	.115	.124	2.95	3.15	
F	.033	.041	.840	1.04	
Н	.264	.287	6.71	7.29	
1	.012	_	.310	_	
J	_	10°	_	10°	
K	10°	16°	10°	16°	
L	.0008	.0040	.0203	.1018	
М	10°	16°	10°	16°	
N	.010	.014	.250	.360	



Ordering Information

Product Number	Package
FAN1616ADX	TO-252 in tape and reel
FAN1616ASX	SOT-223 in tape and reel
FAN1616AD18X	TO-252 in tape and reel
FAN1616AS18X	SOT-223 in tape and reel
FAN1616AD25X	TO-252 in tape and reel
FAN1616AS25X	SOT-223 in tape and reel
FAN1616AD33X	TO-252 in tape and reel
FAN1616AS33X	SOT-223 in tape and reel
FAN1616AD5X	TO-252 in tape and reel
FAN1616AS5X	SOT-223 in tape and reel

DISCLAIMER

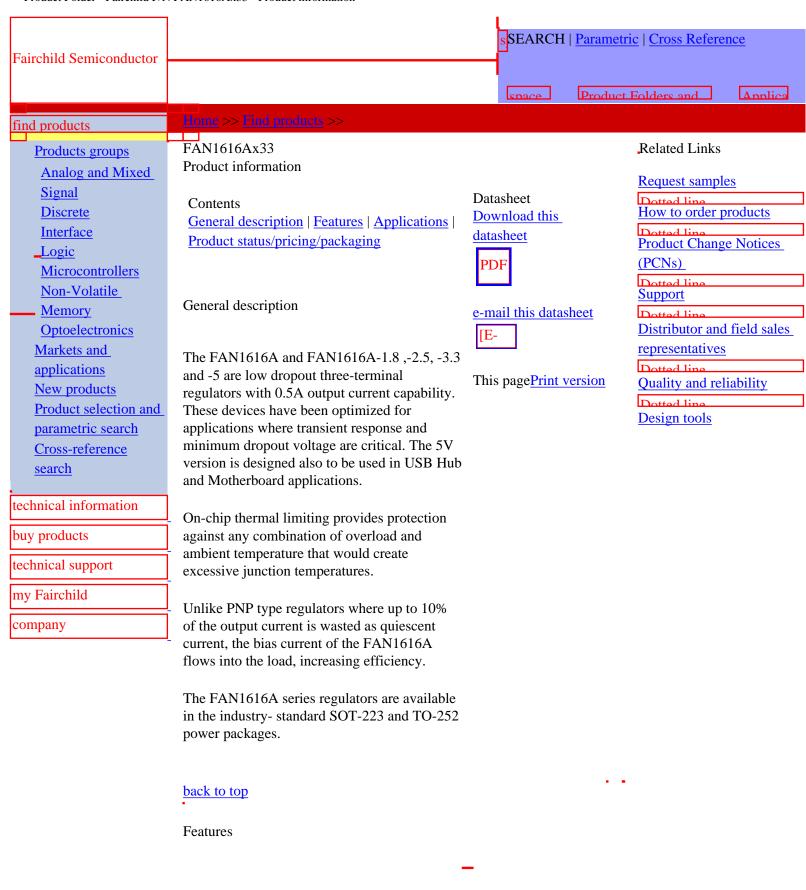
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Product status/pricing/packaging

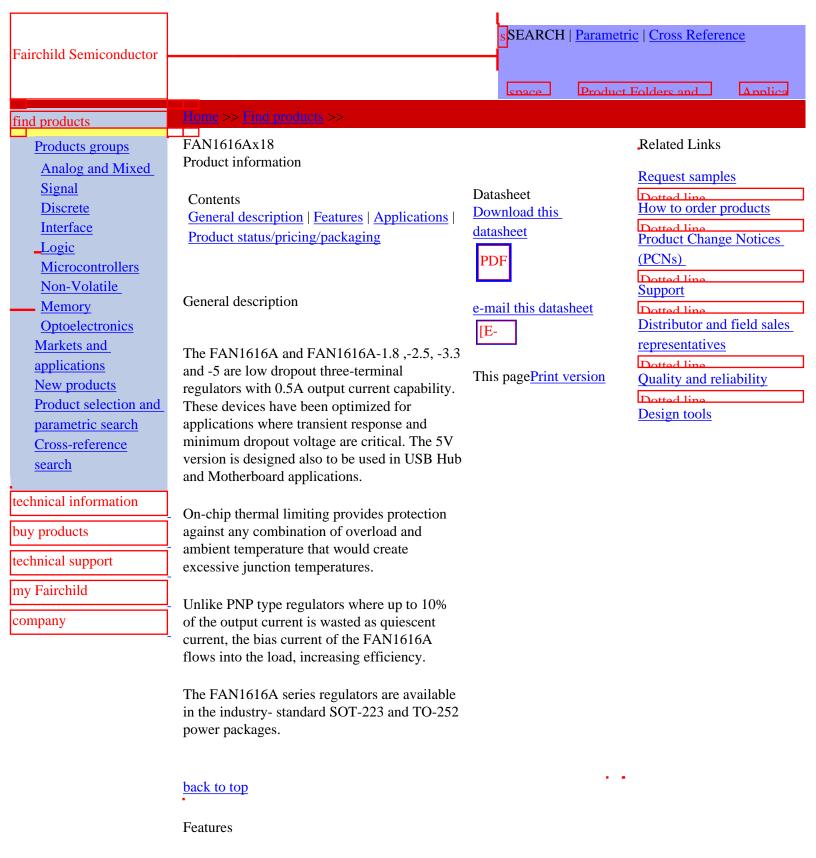
Product	Product status	Pricing*	Package type	Leads	Package marking	Packing method
FAN1616AS33X	Full Production	\$0.443	SOT-223	4	\$Y&Z&2&T 1616AS33 \$.\$.\$.	TAPE REEL
FAN1616AD33X	Full Production	\$0.443	TO-252(DPAK)	3	\$Y&Z&2&T 1616AD33 K	TAPE REEL

^{* 1,000} piece Budgetary Pricing

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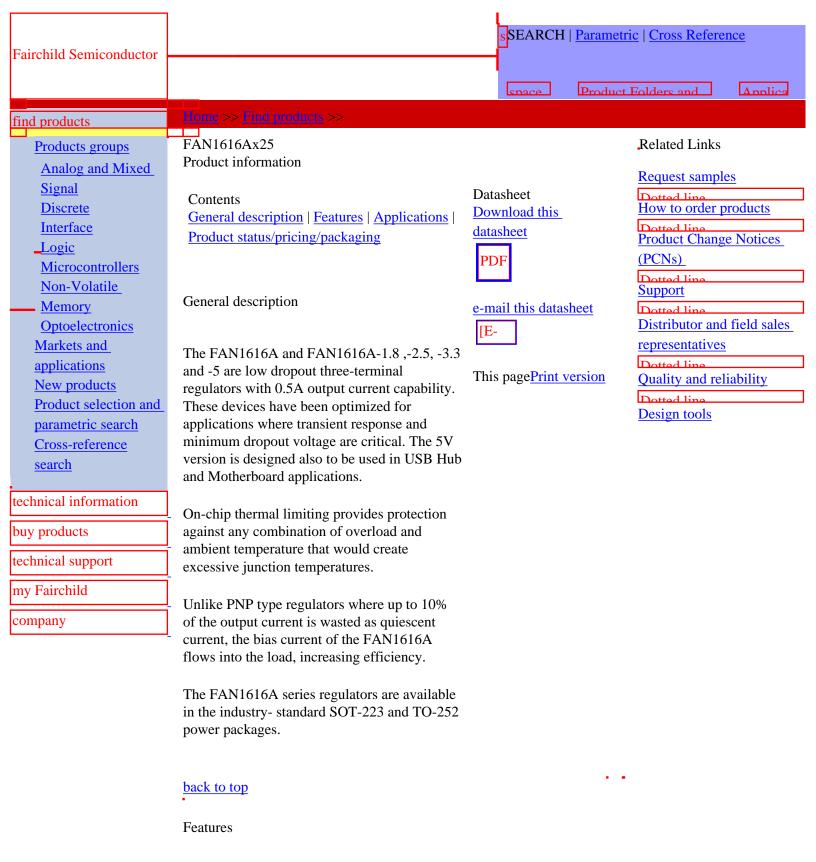
Product status/pricing/packaging

Product	Product status	Pricing*	Package type	Leads	Package marking	Packing method
FAN1616AD18X	Full Production	\$0.443	TO-252(DPAK)	3	\$Y&Z&2&T 1616AD18 K	TAPE REEL
FAN1616AS18X	Full Production	\$0.443	SOT-223	4	\$Y&Z&2&T 1616AS18 \$.\$.\$.	TAPE REEL

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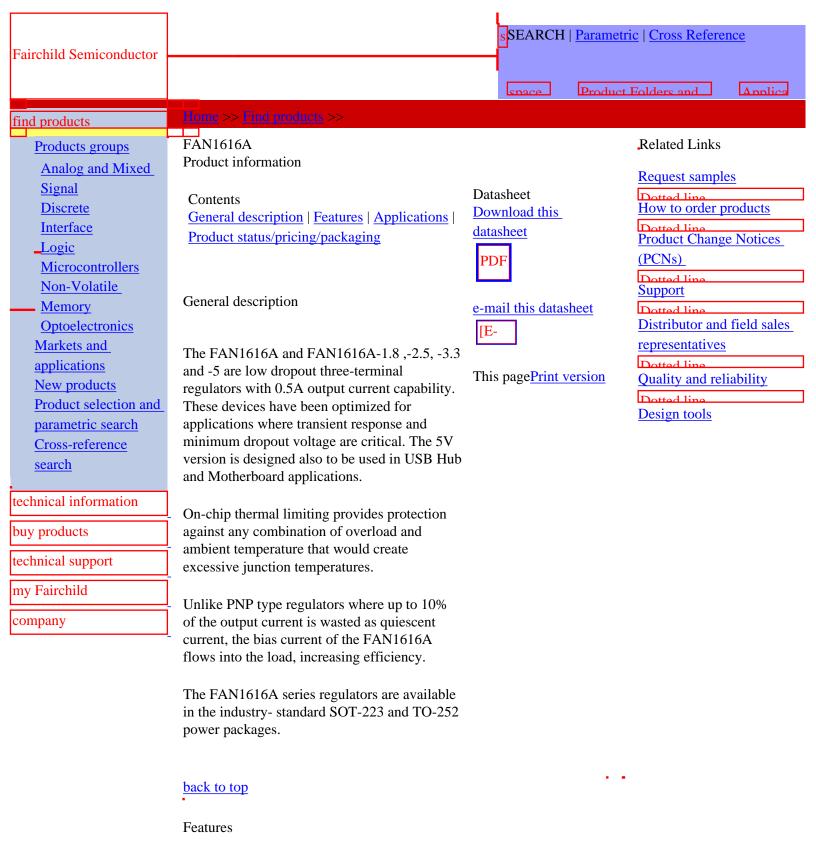
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FAN1616AS25X	Full Production	\$0.443	SOT-223	4	\$Y&Z&2&T 1616AS25 \$.\$.\$.	TAPE REEL

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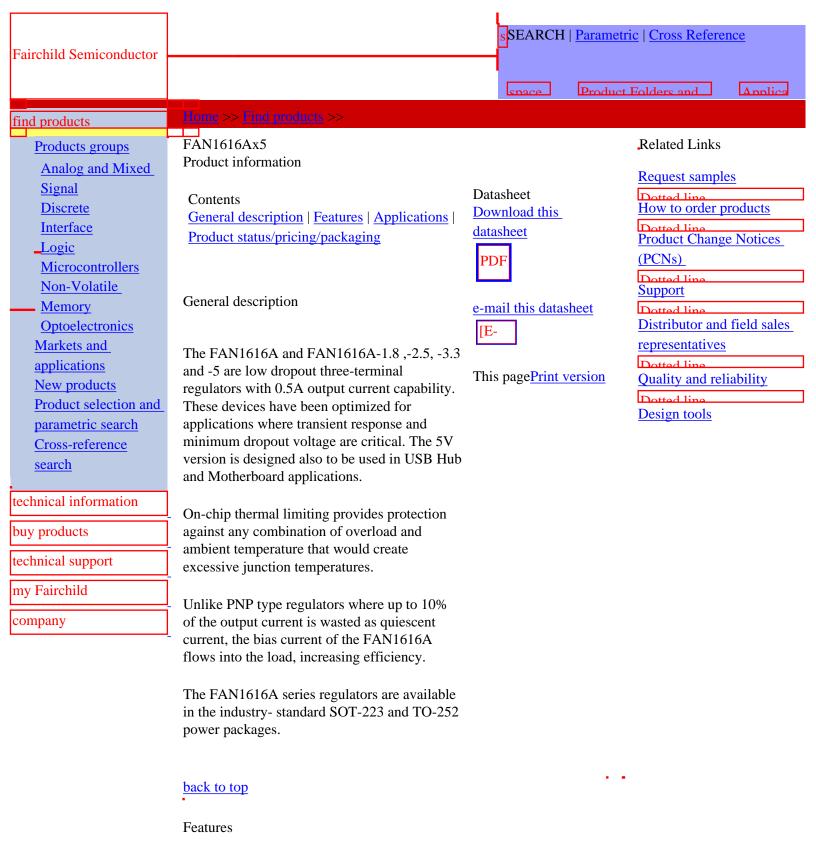
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FAN1616AD5X	Full Production	N/A	TO-252(DPAK)	3	\$Y&Z&2&T 1616AD5 K	TAPE REEL

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