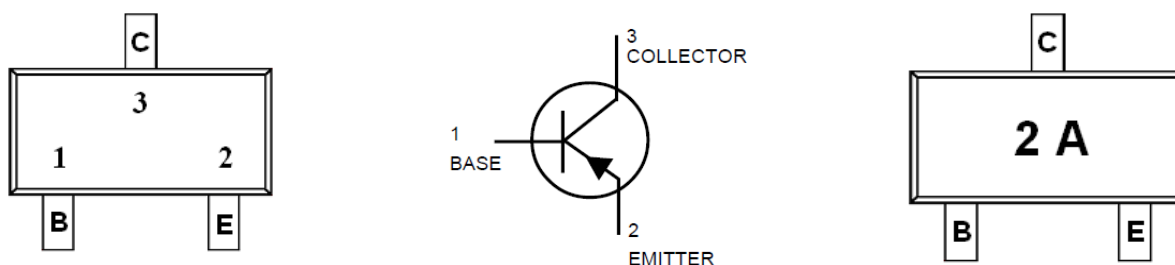




Features

•This device is designed for general purpose amplifier and switching applications at collector currents of 10μA to 100mA.

Pin Description (SOT-23)



Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFT3906T1S23RG	2A	SOT-23	Tape & Reel	3000 EA

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{CEO}	Collector-Emitter Voltage	-40	V
V_{CBO}	Collector-Base Voltage	-40	V
V_{EBO}	Emitter-Base Voltage	-5.0	V
I_C	Collector Current - Continuous	-200	mA
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	$^{\circ}\text{C}$

Notes :

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics ($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Symbol	Parameter	Max.	Unit
P_D	Total Device Dissipation FR-5 Board, (1) $T_A = 25^{\circ}\text{C}$	225	mW
	Derate above 25°C	1.8	mW/ $^{\circ}\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	556	$^{\circ}\text{C}/\text{W}$
P_D	Total Device Dissipation Alumina Substrate, (2) $T_A = 25^{\circ}\text{C}$	300	mW
	Derate above 25°C	2.4	mW/ $^{\circ}\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	417	$^{\circ}\text{C}/\text{W}$

Notes :

- 1) FR-5 = 1.0 x 0.75 x 0.062 in.
- 2) Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



Electrical Characteristics ($T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Max.	Unit
Off Characteristics					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage *	$I_C = -1.0\text{mA}, I_B = 0$	-40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -10\mu\text{A}, I_E = 0$	-40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = -10\mu\text{A}, I_C = 0$	-5.0		V
I_{BL}	Base Cutoff Current	$V_{CE} = -30\text{V}, V_{EB} = -3\text{V}$		-50	nA
I_{CEX}	Collector Cutoff Current	$V_{CE} = -30\text{V}, V_{EB} = -3\text{V}$		-50	nA
On Characteristics *					
h_{FE}	DC Current Gain	$I_C = -0.1\text{mA}, V_{CE} = -1.0\text{V}$	60		
		$I_C = -1.0\text{mA}, V_{CE} = -1.0\text{V}$	80		
		$I_C = -10\text{mA}, V_{CE} = -1.0\text{V}$	100	300	
		$I_C = -50\text{mA}, V_{CE} = -1.0\text{V}$	60		
		$I_C = -100\text{mA}, V_{CE} = -1.0\text{V}$	30		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$		-0.25	V
		$I_C = -50\text{mA}, I_B = -5.0\text{mA}$		-0.4	
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$	-0.65	-0.85	V
		$I_C = -50\text{mA}, I_B = -5.0\text{mA}$		-0.95	
Small Signal Characteristics					
f_T	Current Gain - Bandwidth Product	$I_C = -10\text{mA}, V_{CE} = -20\text{V}, f = 100\text{MHz}$	250		MHz
C_{obo}	Output Capacitance	$V_{CB} = -5.0\text{V}, I_E = 0, f = 1.0\text{MHz}$		4.5	pF
C_{ibo}	Input Capacitance	$V_{EB} = -0.5\text{V}, I_C = 0, f = 1.0\text{MHz}$		10	pF
NF	Noise Figure	$I_C = -100\mu\text{A}, V_{CE} = -5.0\text{V}, R_S = 1.0\text{k}\Omega, f = 1.0\text{kHz}$		4.0	dB
h_{ie}	Input Impedance	$V_{CE} = -10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$	2.0	12	k Ω
h_{re}	Voltage Feedback Ratio	$V_{CE} = -10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$	0.1	10	X10 ⁻⁴
h_{fe}	Small-Signal Current Gain	$V_{CE} = -10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$	100	400	
h_{oe}	Output Admittance	$V_{CE} = -10\text{V}, I_C = 1.0\text{mA}, f = 1.0\text{kHz}$	3.0	60	umhos
Switching Characteristics					
t_d	Delay Time	$V_{CC} = -3.0\text{V}, V_{BE} = -0.5\text{V}$		35	ns
t_r	Rise Time	$I_C = -10\text{mA}, I_{B1} = -1.0\text{mA}$		35	ns
t_s	Storage Time	$V_{CC} = -3.0\text{V}, I_C = -10\text{mA}, I_{B1} = I_{B2} = -1.0\text{mA}$		225	ns
t_f	Fall Time			75	ns

* Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

Test Circuits

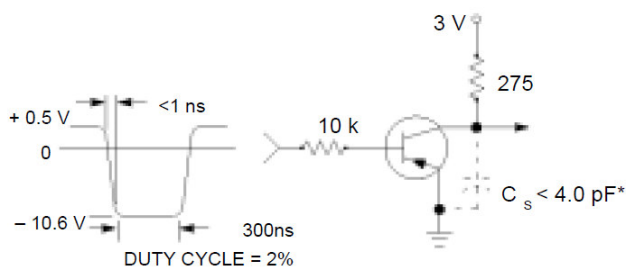


Figure 1: Delay and Rise Time Equivalent Test Circuit

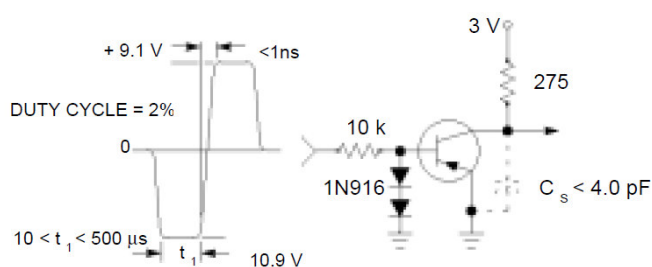
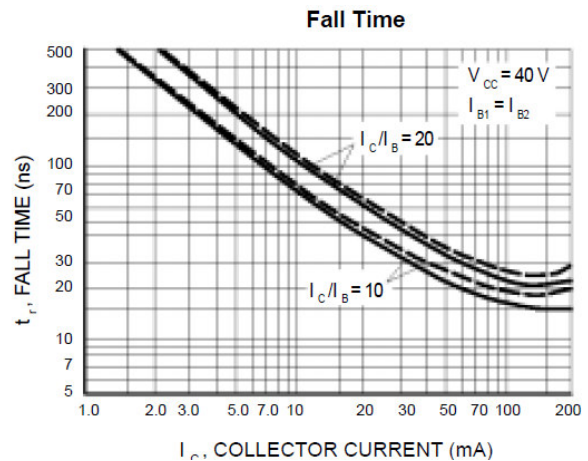
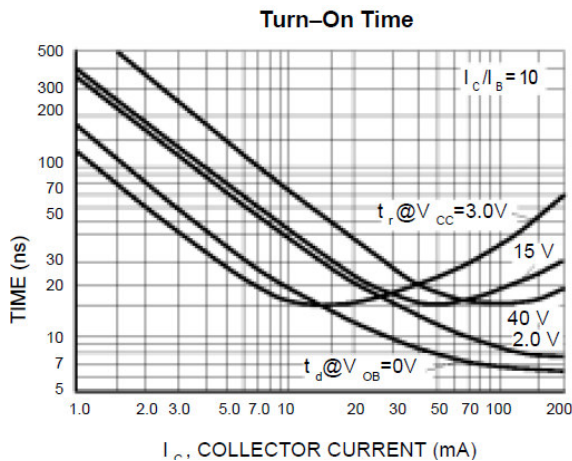
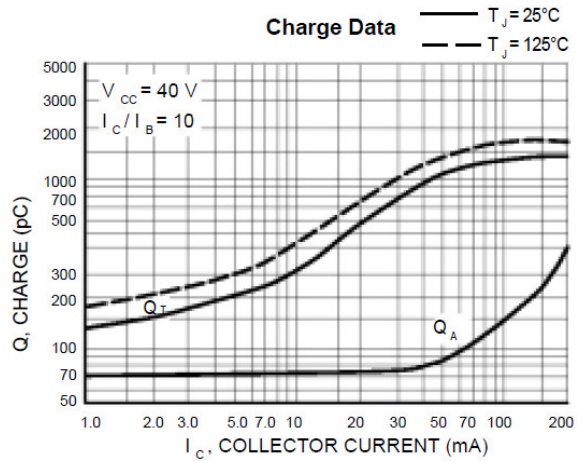
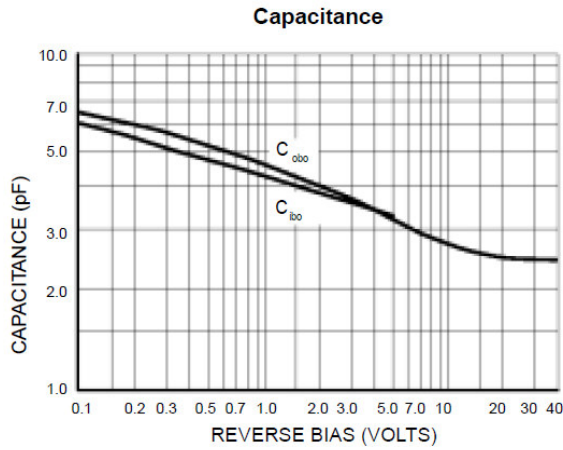


Figure 2: Storage and Fall Time Equivalent Test Circuit



Typical Characteristics (TRANSIENT)

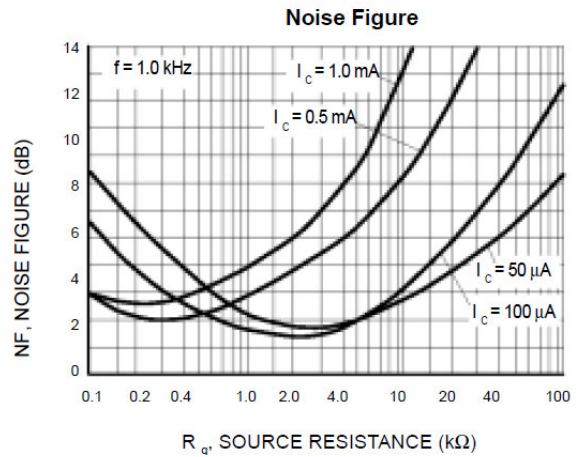
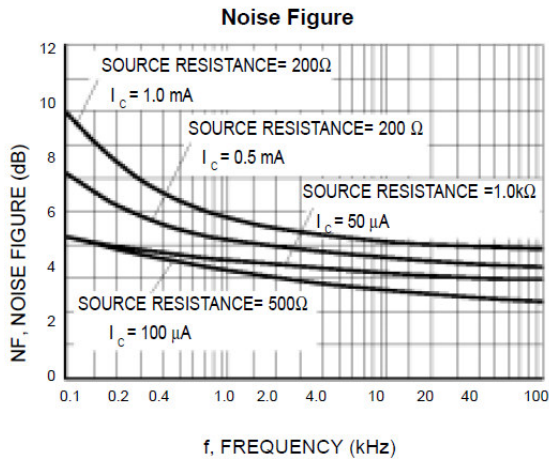




Typical Characteristics (AUDIO SMALL-SIGNAL)

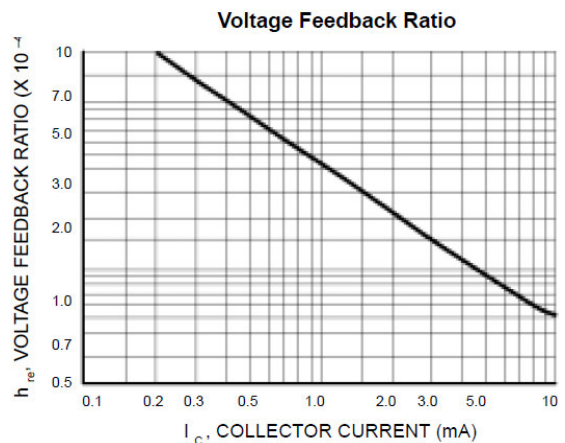
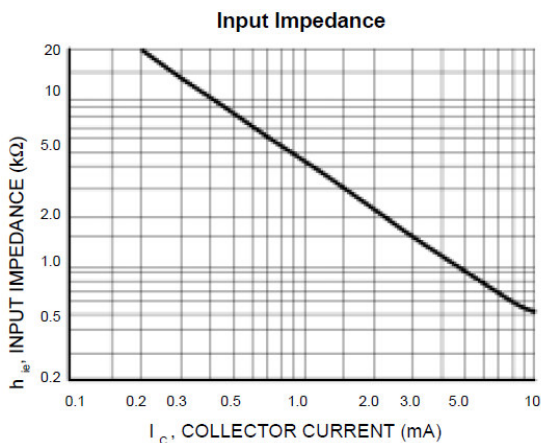
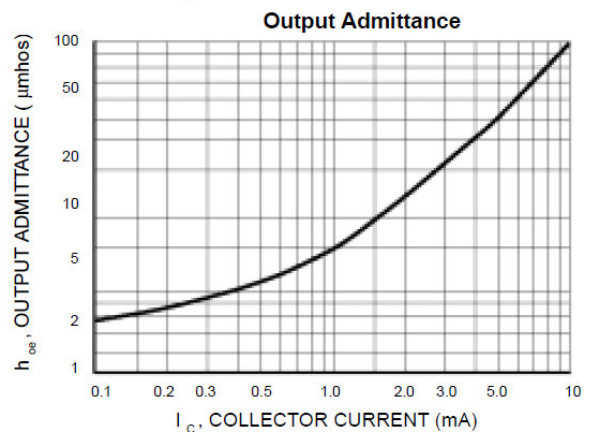
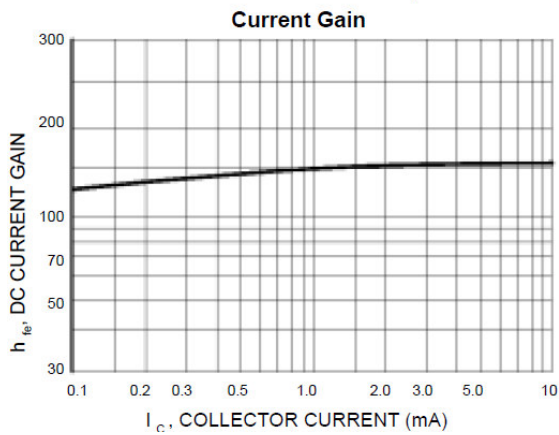
NOISE FIGURE VARIATIONS

($V_{CE} = -5.0$ Vdc, $T_A = 25^\circ\text{C}$, Bandwidth = 1.0 Hz)



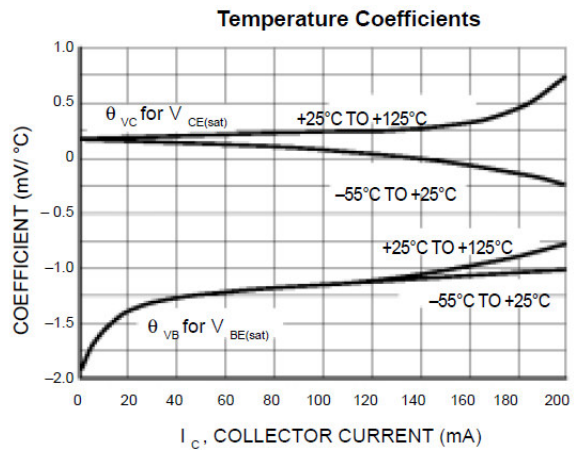
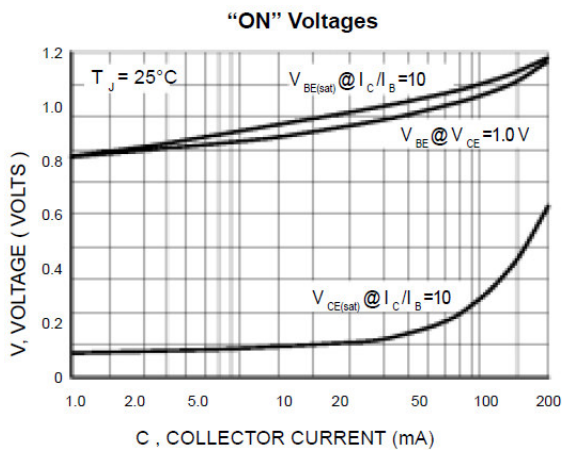
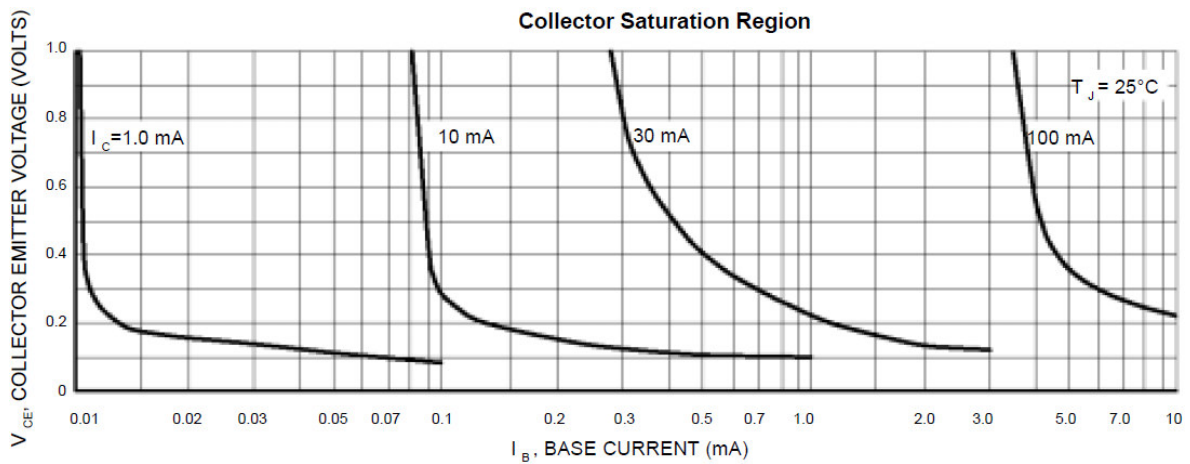
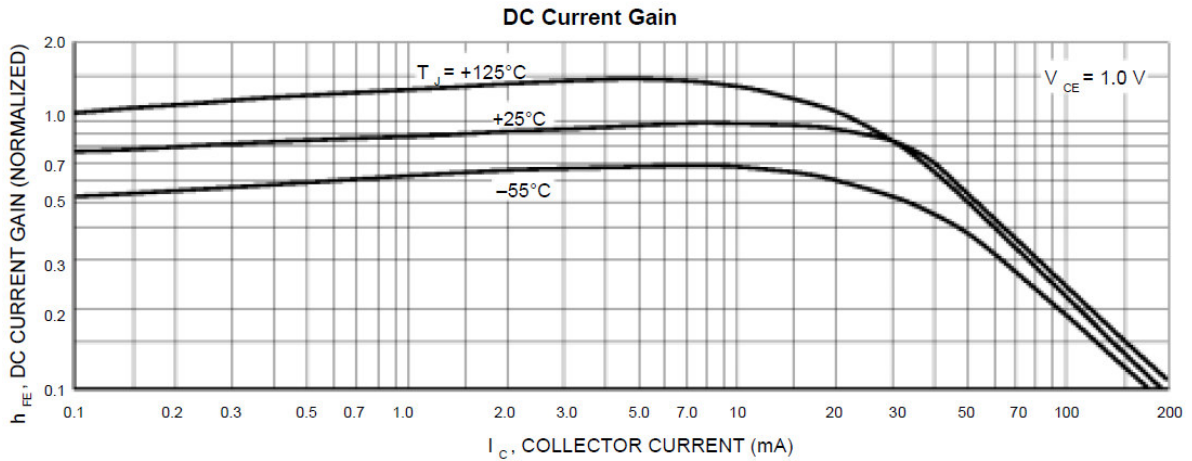
h PARAMETERS

($V_{CE} = 10$ Vdc, $f = 1.0$ kHz, $T_A = 25^\circ\text{C}$)



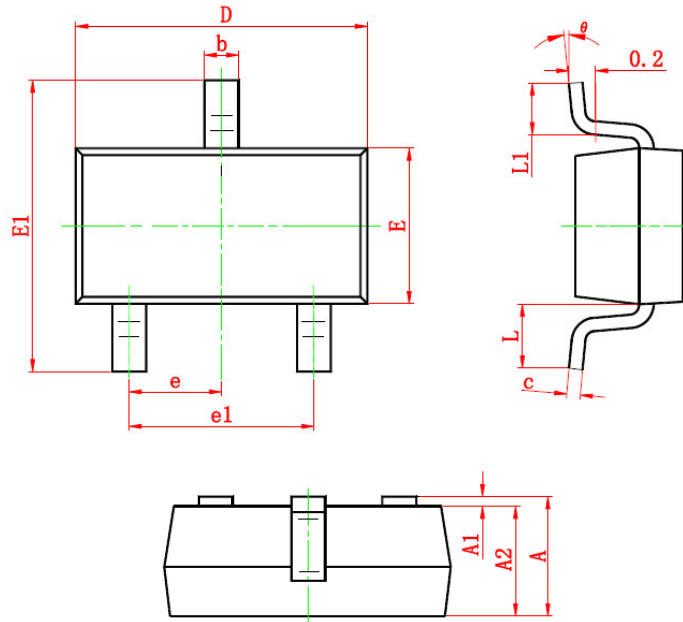


Typical Characteristics (STATIC)





Package Information (SOT-23)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.100	0.035	0.039
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	6°

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 2F, No.80, Sec.1, Cheng Kung Rd., Nan Kang Dist., Taipei City 115, Taiwan (R.O.C.)
 Tel : 886 2) 2651 3928
 Fax : 886 2) 2786 8483
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