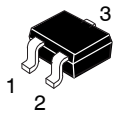
RF Transistor

10 V, 70 mA, f_T = 1.5 GHz, NPN Single MCP

15GN03MA



SC−70 / MCP3
CASE 419AJ

Features

- High Cut−off Frequency: f_T = 1.5 GHz Typ
- High Gain: $|S21e|^2$ = 13 dB Typ (f = 1 GHz)
- Ultrasmall Package Permitting Applied Sets to be Small and Slim
- This is a Pb−Free Device

Applications

- VHF, RF, MIXER, OSC, IF Amplifier

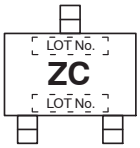
Specifications

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Symbol	Parameter	Conditions	Value	Unit
V_{CBO}	Collector−to−Base Voltage		20	V
V_{CEO}	Collector−to−Emitter Voltage		10	V
V_{EBO}	Emitter−to−Base Voltage		3	V
I_C	Collector Current		70	mA
P_C	Collector Dissipation	When mounted on ceramic substrate (250 mm^2 x 0.8 mm)	400	mW
Tj	Junction Temperature		150	°C
Tstg	Storage Temperature		−55 to +150	°C

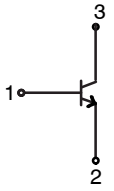
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MARKING DIAGRAM



ZC = Specific Device Code

ELECTRICAL CONNECTION



1: Base
2: Emitter
3: Collector

ORDERING INFORMATION

Device	Package	Shipping†
15GN03MA−TL−E	MCP3 (Pb−Free)	3,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Collector Cutoff Current	I_{CBO}	V_{CB} = 10 V, I_E = 0 A	–	–	0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 2 V, I_C = 0 A	–	–	1	μA
DC Current Gain	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	100	–	180	
Gain−Bandwidth Product	f_T	V_{CE} = 5 V, I_C = 20 mA	1.0	1.5	–	GHz
Output Capacitance	Cob	V_{CB} = 10 V, f = 1 MHz	–	0.95	1.25	pF
Reverse Transfer Capacitance	Cre		–	0.65	–	pF
Forward Transfer Gain	$\|S21e\|^2$	V_{CE} = 5 V, I_C = 20 mA, f = 0.4 GHz	10	13	–	dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 2 mA, f = 0.4 GHz	–	1.6	–	dB

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

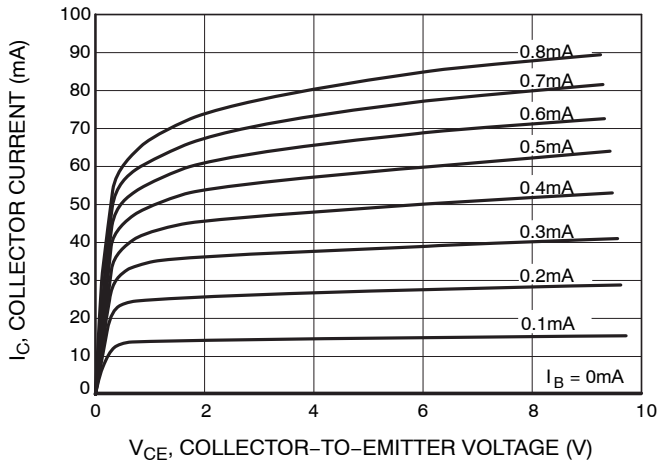


Figure 1. $I_C - V_{CE}$

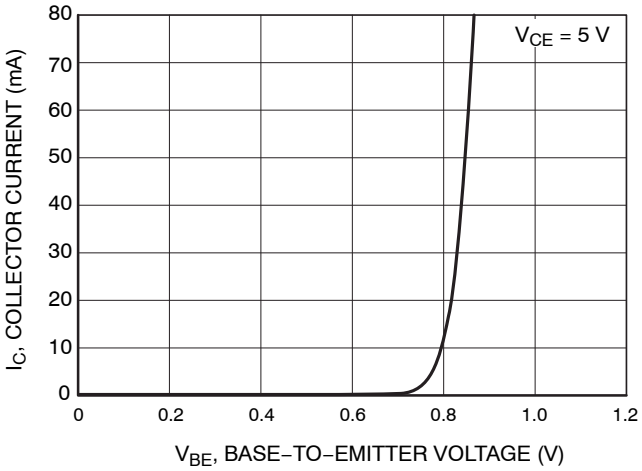


Figure 2. $I_C - V_{BE}$

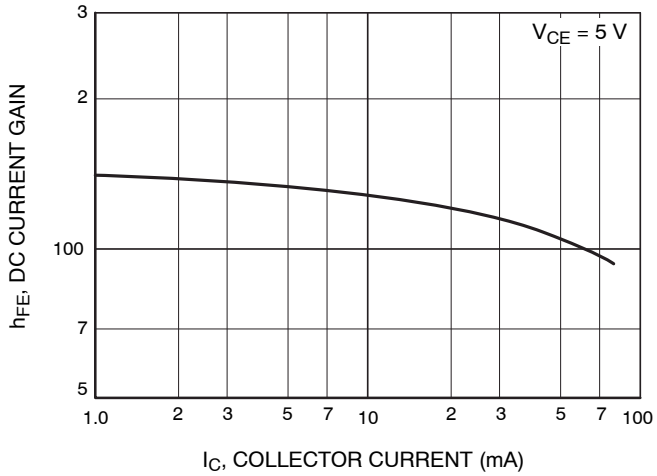


Figure 3. $h_{FE} - I_C$

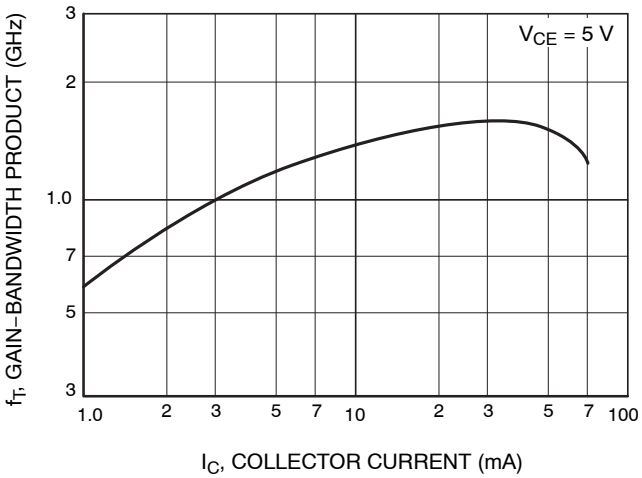


Figure 4. $f_T - I_C$

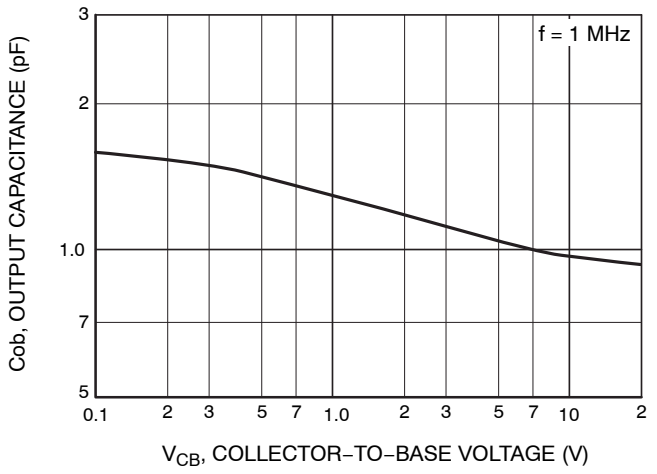


Figure 5. Cob – V_{CB}

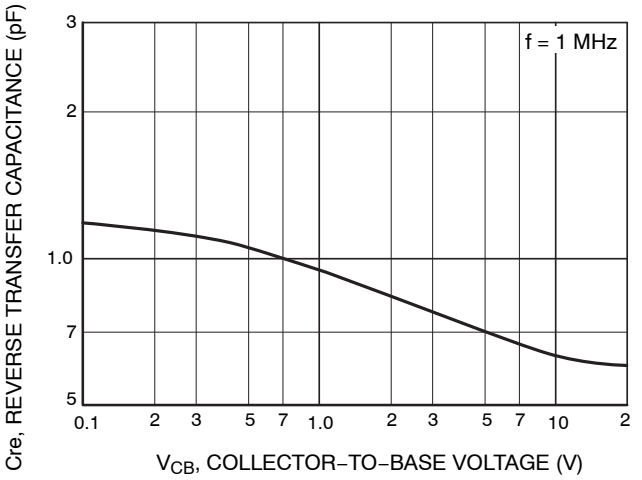


Figure 6. Cre – V_{CB}

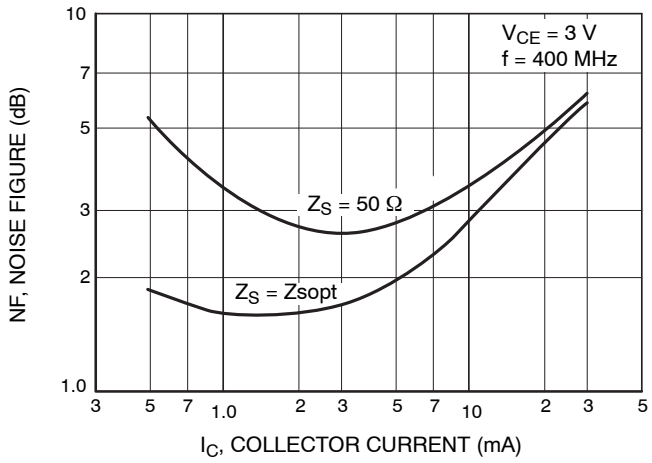


Figure 7. NF – I_C

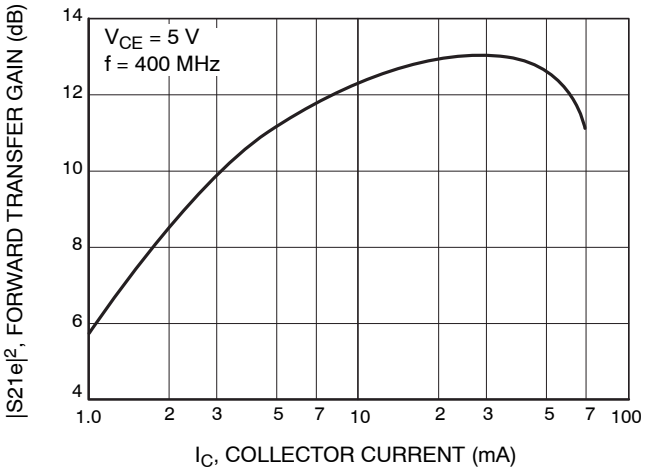


Figure 8. $|S21e|^2$ – I_C

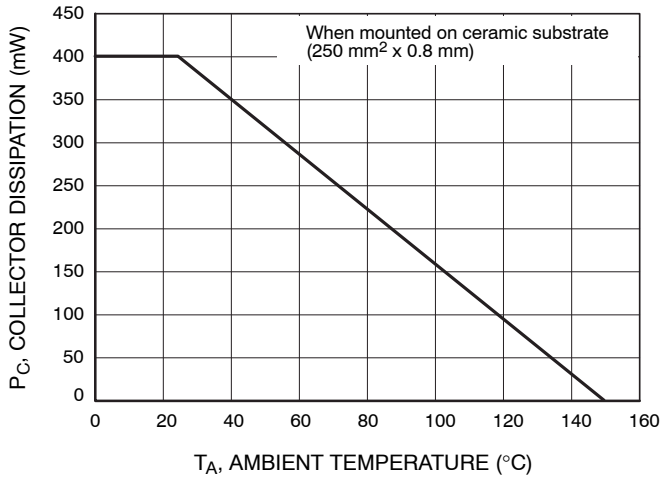


Figure 9. P_C – T_A

S Parameters (Common Emitter)

V_{CE} = 5 V, I_C = 1 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.927	−39.48	3.051	153.95	0.045	66.57	0.938	−5.28
200	0.877	−72.13	2.643	134.85	0.072	53.42	0.879	−10.12
300	0.831	−97.09	2.258	118.70	0.090	41.89	0.834	−15.17
400	0.796	−115.43	1.925	105.65	0.093	33.66	0.806	−20.70
500	0.772	−128.51	1.645	95.12	0.090	29.42	0.796	−25.57
600	0.759	−139.76	1.420	86.92	0.085	28.20	0.796	−28.96
700	0.754	−148.33	1.255	80.31	0.080	30.19	0.792	−31.48
800	0.750	−155.54	1.132	74.68	0.072	36.45	0.790	−34.42
900	0.746	−162.07	1.033	69.44	0.067	44.81	0.793	−37.89
1000	0.743	−167.59	0.948	65.05	0.065	55.74	0.796	−41.83

V_{CE} = 5 V, I_C = 3 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.819	−66.73	7.544	137.99	0.036	55.23	0.862	−14.15
200	0.733	−107.53	5.274	115.44	0.050	43.07	0.730	−17.07
300	0.698	−130.44	3.901	102.51	0.055	40.37	0.691	−20.60
400	0.682	−144.75	3.111	93.53	0.056	41.56	0.673	−22.18
500	0.674	−154.20	2.563	85.87	0.056	46.54	0.680	−25.14
600	0.669	−161.91	2.175	79.64	0.057	53.71	0.686	−28.23
700	0.669	−167.44	1.884	74.61	0.061	62.91	0.686	−30.58
800	0.671	−172.33	1.680	70.09	0.067	70.67	0.690	−33.35
900	0.672	−176.77	1.520	65.76	0.075	78.25	0.695	−36.65
1000	0.672	179.40	1.386	61.98	0.086	83.86	0.700	−40.53

V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.745	−85.56	10.487	129.32	0.031	52.32	0.808	−17.13
200	0.673	−125.68	6.596	107.46	0.041	43.79	0.695	−19.72
300	0.650	−144.45	4.641	95.99	0.044	45.46	0.655	−20.94
400	0.643	−155.93	3.583	88.14	0.046	51.02	0.641	−22.34
500	0.641	−163.08	2.926	81.98	0.051	57.47	0.638	−24.48
600	0.641	−169.17	2.468	76.86	0.055	65.57	0.640	−27.05
700	0.642	−173.85	2.139	72.14	0.064	72.10	0.640	−29.96
800	0.645	−177.59	1.898	68.01	0.072	78.01	0.643	−32.86
900	0.648	179.02	1.708	64.03	0.082	84.74	0.654	−36.05
1000	0.649	175.69	1.565	60.67	0.096	88.35	0.663	−39.64

S Parameters (Common Emitter)

V_{CE} = 5 V, I_C = 10 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.648	−111.11	13.755	118.07	0.025	49.17	0.710	−18.60
200	0.617	−144.00	7.787	99.84	0.031	50.50	0.618	−18.94
300	0.610	−157.84	5.322	90.62	0.035	55.71	0.593	−19.18
400	0.611	−165.84	4.071	84.05	0.042	63.53	0.585	−20.81
500	0.612	−171.10	3.295	78.75	0.049	72.26	0.585	−23.14
600	0.616	−175.51	2.770	74.15	0.059	76.93	0.591	−25.68
700	0.620	−179.00	2.401	69.78	0.068	81.33	0.595	−28.62
800	0.622	178.16	2.122	65.84	0.080	85.49	0.598	−31.66
900	0.629	175.42	1.906	62.06	0.091	88.11	0.610	−34.80
1000	0.632	172.79	1.741	58.71	0.104	90.16	0.619	−38.30

V_{CE} = 5 V, I_C = 15 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.608	−124.26	15.141	112.79	0.021	49.66	0.661	−18.68
200	0.596	−152.05	8.271	96.59	0.028	56.25	0.584	−17.69
300	0.594	−163.33	5.613	88.34	0.034	63.87	0.566	−18.43
400	0.600	−169.82	4.267	82.26	0.042	71.61	0.561	−19.87
500	0.601	−173.91	3.457	77.23	0.052	77.39	0.564	−22.13
600	0.606	−177.77	2.902	72.65	0.061	81.90	0.570	−24.90
700	0.613	179.41	2.501	68.50	0.071	84.02	0.573	−27.96
800	0.617	176.72	2.210	64.59	0.083	86.75	0.579	−30.98
900	0.624	174.31	1.988	60.86	0.094	88.46	0.592	−34.26
1000	0.628	171.96	1.808	57.39	0.108	90.57	0.599	−37.51

V_{CE} = 5 V, I_C = 20 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.587	−132.33	15.887	109.73	0.018	50.98	0.630	−18.23
200	0.589	−156.83	8.517	94.77	0.026	60.57	0.563	−17.10
300	0.590	−166.31	5.751	86.97	0.034	66.88	0.549	−17.73
400	0.593	−171.88	4.373	80.95	0.043	73.76	0.547	−19.30
500	0.598	−175.61	3.529	76.08	0.052	79.21	0.552	−21.55
600	0.604	−178.89	2.958	71.70	0.063	82.86	0.558	−24.41
700	0.611	178.36	2.550	67.43	0.073	85.71	0.560	−27.19
800	0.616	176.07	2.257	63.56	0.085	87.76	0.569	−30.31
900	0.624	173.75	2.026	59.99	0.097	89.02	0.581	−33.63
1000	0.628	171.39	1.838	56.47	0.109	90.88	0.590	−36.92

S Parameters (Common Emitter)

V_{CE} = 5 V, I_C = 30 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.574	−141.90	16.518	106.28	0.017	56.75	0.594	−17.60
200	0.584	−161.69	8.702	92.68	0.024	65.21	0.541	−16.13
300	0.587	−169.42	5.851	85.19	0.033	71.56	0.531	−16.69
400	0.596	−174.12	4.433	79.42	0.042	77.01	0.532	−18.41
500	0.599	−177.29	3.570	74.54	0.053	82.34	0.536	−20.78
600	0.609	179.93	2.987	70.07	0.063	84.47	0.545	−23.60
700	0.616	177.48	2.574	65.88	0.073	86.83	0.550	−26.54
800	0.621	175.27	2.268	61.99	0.085	88.18	0.559	−29.78
900	0.631	173.12	2.033	58.20	0.096	90.72	0.571	−33.08
1000	0.638	170.96	1.845	54.81	0.111	91.80	0.582	−36.46

V_{CE} = 5 V, I_C = 50 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.578	−151.54	16.222	102.78	0.015	58.15	0.564	−16.24
200	0.596	−166.79	8.428	90.13	0.023	71.59	0.524	−14.78
300	0.603	−172.63	5.641	82.89	0.033	76.27	0.520	−15.94
400	0.611	−176.28	4.254	77.21	0.043	79.95	0.521	−17.71
500	0.618	−178.98	3.421	72.11	0.052	83.78	0.530	−20.31
600	0.629	178.44	2.851	67.60	0.064	86.83	0.538	−23.39
700	0.639	176.23	2.452	63.15	0.074	88.24	0.546	−26.40
800	0.647	174.01	2.155	59.33	0.087	89.54	0.555	−29.74
900	0.657	171.87	1.921	55.44	0.099	92.59	0.568	−33.37
1000	0.664	169.65	1.740	51.95	0.113	94.10	0.581	−36.94

Land Pattern Example

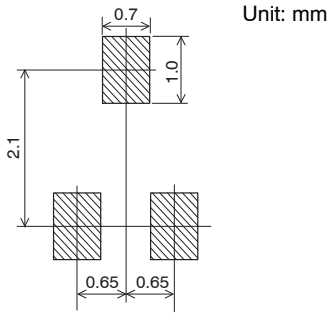


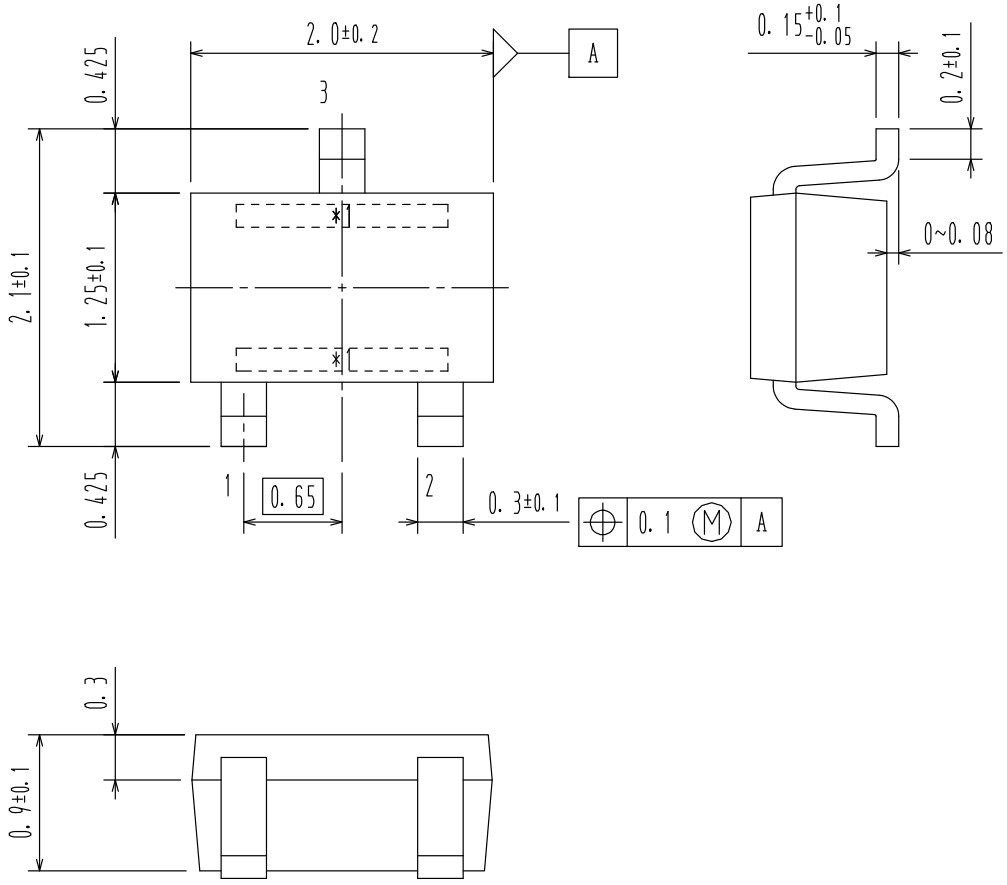
Figure 10. Land Pattern Example

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

SC−70 / MCP3
CASE 419AJ
ISSUE O

DATE 30 NOV 2011



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DESCRIPTION:	**SC−70 / MCP3**	**PAGE 1 OF 1**

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