MXD8661H

High Power SP6T for 2G/3G/4G Applications

General Description

The MXD8661H is a low loss, high power SP6T switch for 2G/3G/4G TRX applications.

The MXD8661H is compatible with +1.0V control logic, which is a key requirement for most cellular transceivers. This part is packaged in a compact 2mm x 2mm, 14-pin, QFN package which allows for a small solution size with no need for external DC blocking capacitors (when no external DC is applied to the device ports).

Features

- Excellent insertion loss and isolation performance
  - 0.5 dB Insertion Loss at 2.7GHz
  - 25 dB Isolation at 2.7GHz
  - 36dBm of P0.1dB
- Multi-Band operation 100MHz to 3000MHz
- Compact 2mm x 2mm in QFN-14 package，MSL1
- No DC blocking capacitors required (unless external DC is applied to the RF ports)

Applications

- 2G/3G/4G TRX
- Cellular modems and USB Devices

Functional Block Diagram and Pin Function

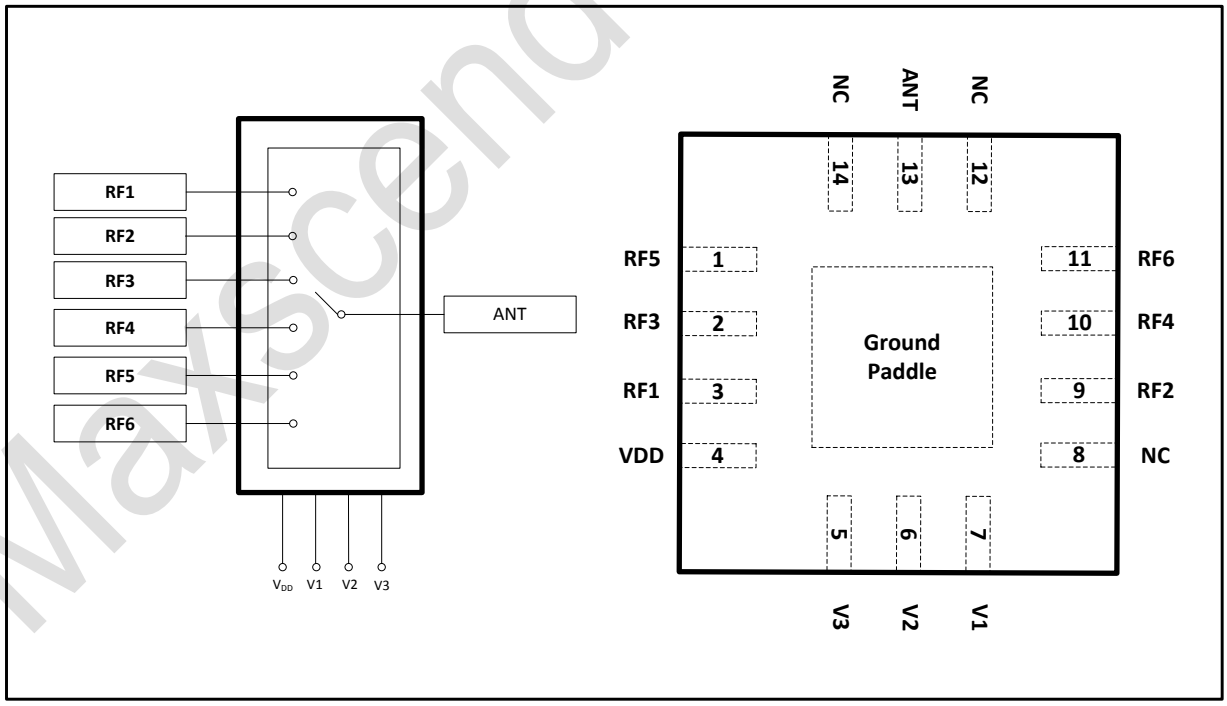


Figure 1 Functional Block Diagram and Pinout (Top View)

Application Circuit

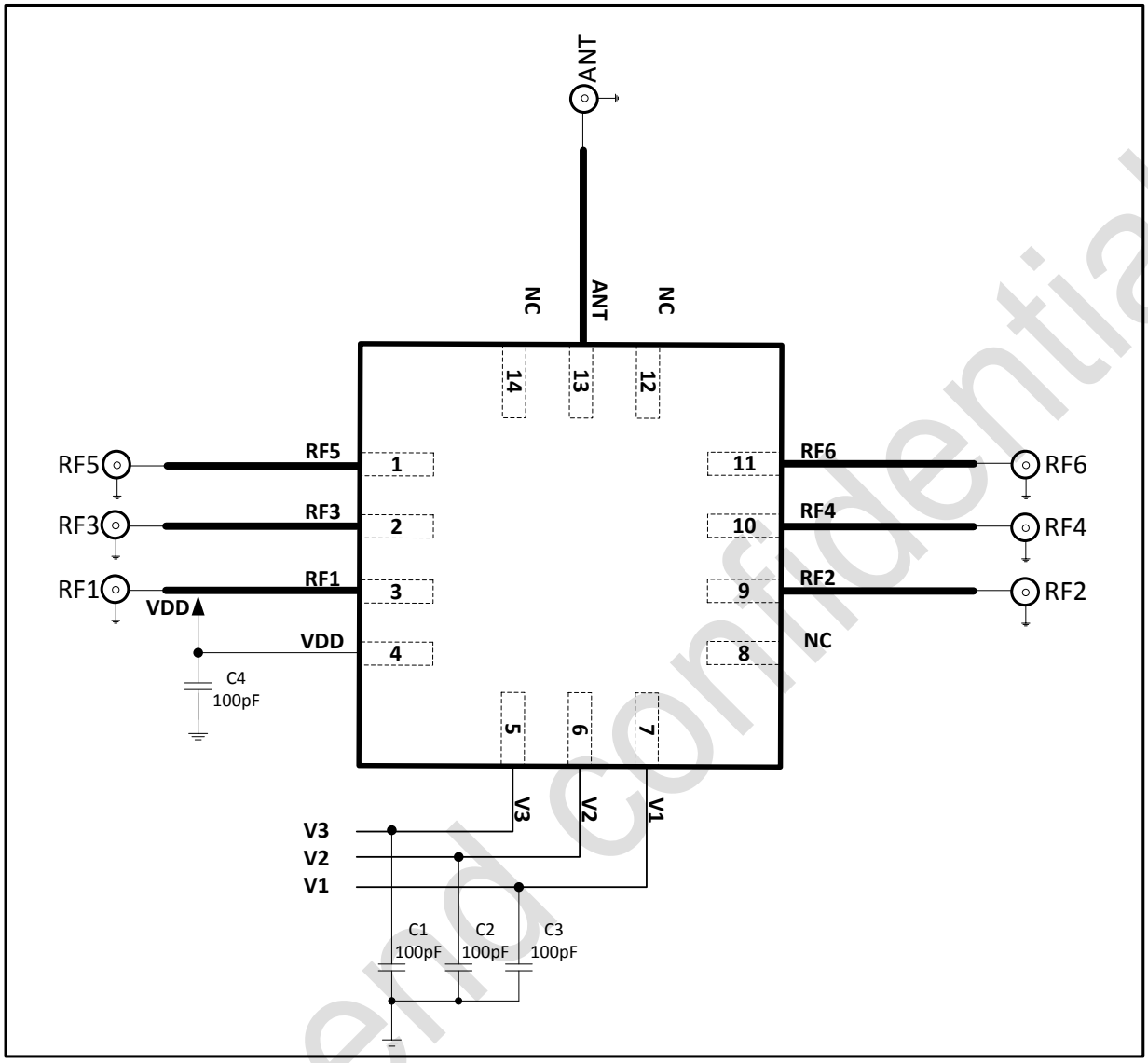


Figure 2 MXD8661H Evaluation Board Schematic

Table 1. Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	RF5	RF port5	8	NC	No connection
2	RF3	RF port3	9	RF2	RF port2
3	RF1	RF port1	10	RF4	RF port4
4	V_{DD}	Power supply	11	RF6	RF port6
5	V3	Control logic 3#	12	NC	No connection
6	V2	Control logic 2#	13	ANT	Antenna port
7	V1	Control logic 1#	14	NC	No connection
Ground Paddle	GND	Ground			

Note: Bottom ground paddles must be connected to ground.

Truth Table

Table 2.

Control pins			Switched RF Outputs					
V1	V2	V3	RF1	RF2	RF3	RF4	RF5	RF6
0	0	0	**Insertion Loss**	Isolation	Isolation	Isolation	Isolation	Isolation
0	0	1	Isolation	**Insertion Loss**	Isolation	Isolation	Isolation	Isolation
0	1	0	Isolation	Isolation	**Insertion Loss**	Isolation	Isolation	Isolation
0	1	1	Isolation	Isolation	Isolation	**Insertion Loss**	Isolation	Isolation
1	0	0	Isolation	Isolation	Isolation	Isolation	**Insertion Loss**	Isolation
1	0	1	Isolation	Isolation	Isolation	Isolation	Isolation	**Insertion Loss**
1	1	X	Isolation					

Note: "1" = 1.0 V to 3.0 V. "0" = 0 V to 0.3 V.

Recommended Operation Range

Table 3. Recommended Operation Condition

Parameters	Symbol	Min	Typ	Max	Units
Operation Frequency	f1	0.1	-	3.0	GHz
Power supply	V_{DD}	2.5	2.8	3.0	V
Switch Control Voltage High	V_H	1.0	1.8	3.0	V
Switch Control Voltage Low	V_L	0	0	0.3	V

Specifications

Table 4. Electrical Specifications

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
DC Specifications						
Supply voltage	V_{DD}		2.5	2.8	3.0	V
Supply current	I_{DD}			45	70	uA
Control voltage: High Low	V_{CTL_H} V_{CTL_L}		1.0 0	1.8 0	3.0 0.3	V V
Control current	I_{CTL}	V_{CTL} = 1.8 V		0.5	1.0	μA
Switching Speed, on RF to another		10% to 90% RF		0.5	1	μs
Turn-on time	t_{on}	Time from V_{DD}=0V to part ON and RF at 90%		5	10	μs
RF Specifications						
Insertion loss (ANT pin to RF1/2/3/4/5/6 pins)	IL	0.1 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.7 GHz		0.35 0.45 0.50	0.40 0.50 0.60	dB dB dB
Isolation (ANT pin to RF1/2/3/4/5/6 pins)	Iso	0.1 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.7 GHz	35 30 22	40 35 25		dB dB dB
Isolation (RFx pin to the other RF pins in RFx to ANT mode，x=1/2/3/4/5/6)	Iso	0.1 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.7 GHz	34 28 20	40 34 24		dB dB dB
Input return loss (ANT pin to RF1/2/3/4/5/6 pins)	RL	0.1 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.7 GHz	20 18 15	25 22 20		dB dB dB
0.1 dB Compression Point (ANT pin to RF1/2/3/4/5/6 pins)	P0.1dB	0.5 GHz to 3.0 GHz		+36		dBm

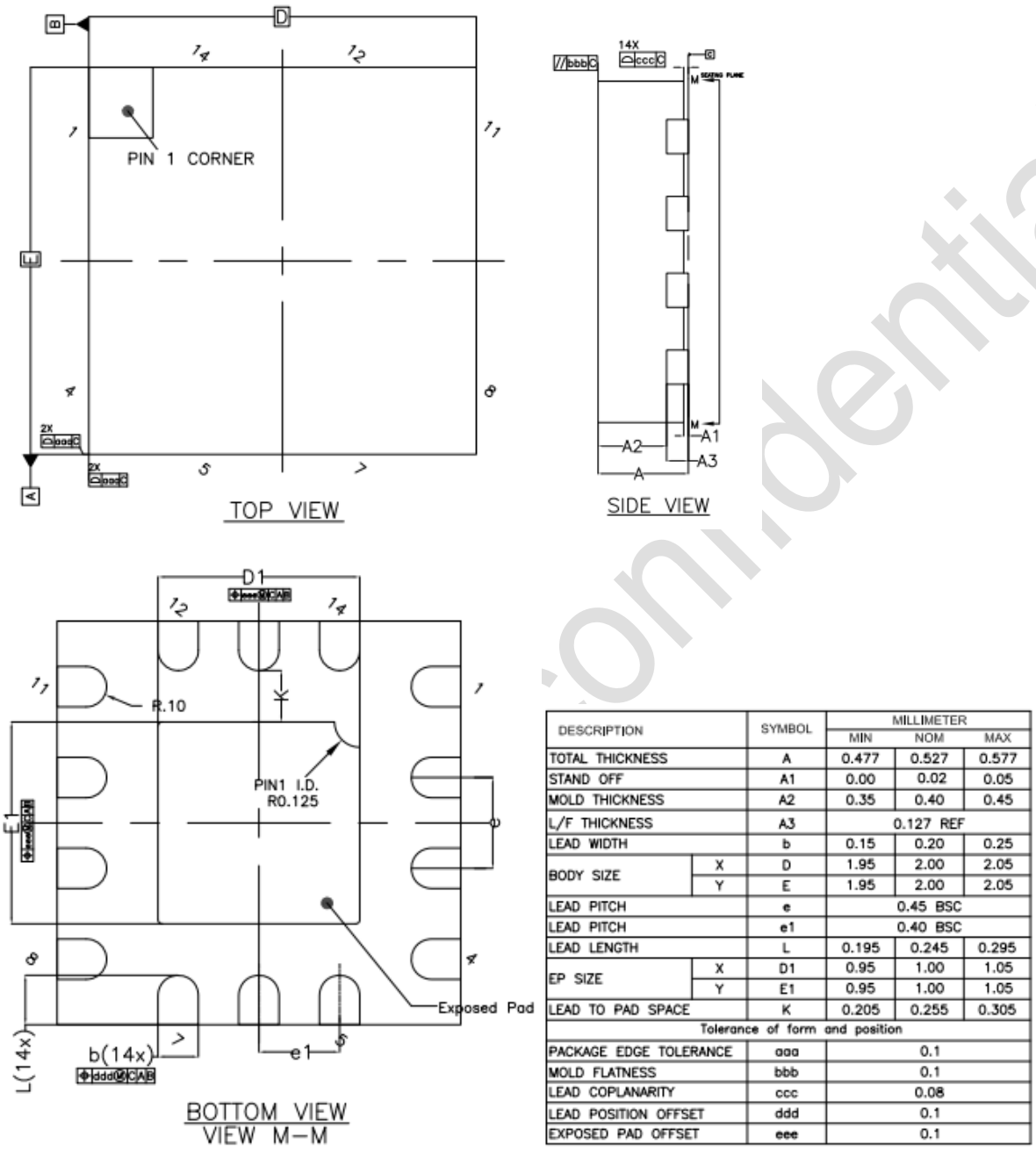
Absolute Maximum Ratings

Table 5. Maximum ratings

Parameters	Symbol	Minimum	Maximum	Units
Supply voltage	V_{DD}	2.5	+3.3	V
Control voltage (V1, V2, and V3)	V_{CTL}	0	+3.0	V
RF input power (RF1 to RF6)	P_{IN}		+36	dBm
Operating temperature	T_{OP}	–30	+90	℃
Storage temperature	T_{STG}	–40	+125	℃
Electrostatic Discharge Human body model (HBM), Class 1C	ESD_HBM		1000	V
Machine Model (MM), Class A	ESD_MM		100	
Charged device model (CDM), Class III	ESD_CDM		500	

Note: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device

Package Outline Dimension



DESCRIPTION		SYMBOL	MILLIMETER		
			MIN	NOM	MAX
TOTAL THICKNESS		A	0.477	0.527	0.577
STAND OFF		A1	0.00	0.02	0.05
MOLD THICKNESS		A2	0.35	0.40	0.45
L/F THICKNESS		A3	0.127 REF		
LEAD WIDTH		b	0.15	0.20	0.25
BODY SIZE	X	D	1.95	2.00	2.05
	Y	E	1.95	2.00	2.05
LEAD PITCH		e	0.45 BSC		
LEAD PITCH		e1	0.40 BSC		
LEAD LENGTH		L	0.195	0.245	0.295
EP SIZE	X	D1	0.95	1.00	1.05
	Y	E1	0.95	1.00	1.05
LEAD TO PAD SPACE		K	0.205	0.255	0.305
Tolerance of form and position					
PACKAGE EDGE TOLERANCE		aaa	0.1		
MOLD FLATNESS		bbb	0.1		
LEAD COPLANARITY		ccc	0.08		
LEAD POSITION OFFSET		ddd	0.1		
EXPOSED PAD OFFSET		eee	0.1		

Figure 3 package outline dimension

Marking Specification

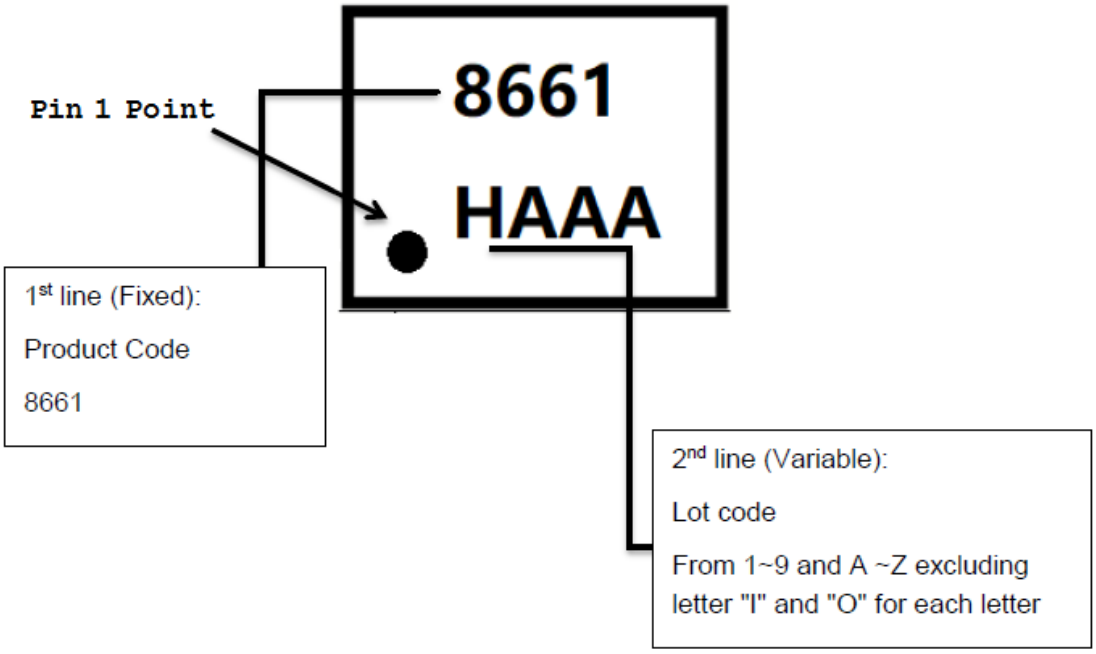


Figure 4 Marking specification (Top View)

Reflow Chart

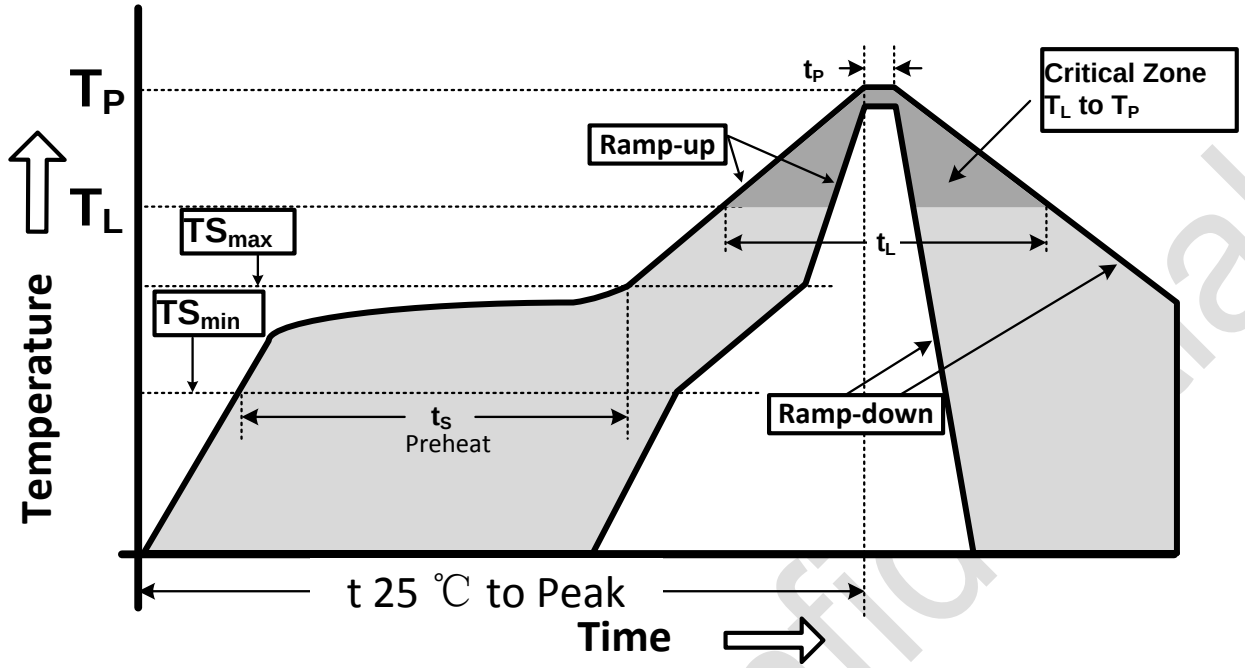


Figure 5 Recommended Lead-Free Reflow Profile

Table 6. Reflow condition

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate（TS_{max} to T_p）	3℃/second max.
Preheat temperature（TS_{min} to TS_{max}）	150℃ to 200℃
Preheat time（t_s）	60 - 180 seconds
Time above TL , 217℃（t_L）	60 - 150 seconds
Peak temperature（T_p）	260℃
Time within 5℃ of peak temperature(t_p)	20 - 40 seconds
Ramp-down rate	6℃/second max.
Time 25℃ to peak temperature	8 minutes max.

ESD Sensitivity

Integrated circuits are ESD sensitive and can be damaged by static electric charge. Proper ESD protection techniques should be used when handling these devices.

RoHS Compliant

This product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), and are considered RoHS compliant.

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