

# MOSFET – Single, N-Channel, Small Signal, SOT-883 (XDFN3), 1.0 x 0.6 x 0.4 mm 30 V, 1000 mA



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## NTNS4C69N

### Features

- Single N-Channel MOSFET
- Ultra Low Profile SOT-883 (XDFN3) 1.0 x 0.6 x 0.4 mm for Extremely Thin Environments such as Portable Electronics
- Low  $R_{DS(on)}$  Solution in Ultra Small 1.0 x 0.6 mm Package
- 1.8 V Gate Drive
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- High Side Switch
- High Speed Interfacing
- Level Shift and Translate
- Optimized for DC-DC Converter Power Management in Ultra Portable Solutions

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter		Symbol	Value	Units	
Drain-to-Source Voltage		$V_{DSS}$	30	V	
Gate-to-Source Voltage		$V_{GS}$	$\pm 12$	V	
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	1000	mA
				$T_A = 85^\circ\text{C}$	
	$t \leq 5$ s	$T_A = 25^\circ\text{C}$		1050	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	$P_D$	178	mW
				$t \leq 5$ s	
Pulsed Drain Current		$t_p = 10$ $\mu\text{s}$	$I_{DM}$	2.6	A
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to 150		$^\circ\text{C}$
Source Current (Body Diode) (Note 2)		$I_S$	187		mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260		$^\circ\text{C}$

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.

### THERMAL RESISTANCE RATINGS

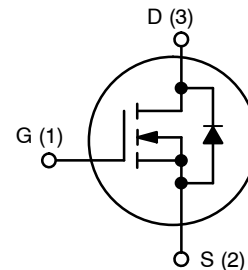
Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	703	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – $t \leq 5$ s (Note 1)	$R_{\theta JA}$	670	

1. Surface Mounted on FR4 Board using the minimum recommended pad size, (or 2 mm<sup>2</sup>), 1 oz Cu.
2. Pulse Test: pulse width  $\leq 300$   $\mu\text{s}$ , duty cycle  $\leq 2\%$ .

### MOSFET

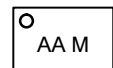
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	$I_D$ MAX
30 V	0.155 $\Omega$ @ 4.5 V	1000 mA
	0.168 $\Omega$ @ 3.7 V	
	0.180 $\Omega$ @ 3.3 V	
	0.220 $\Omega$ @ 2.5 V	
	0.450 $\Omega$ @ 1.8 V	

### N-Channel MOSFET



SOT-883  
(XDFN3)  
CASE 506CB

### MARKING DIAGRAM



AA = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

Device	Package	Shipping†
NTNS4C69NCTCG	SOT-883 (Pb-Free)	8000 / Tape & Reel

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

# NTNS4C69N

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250\ \mu\text{A}$ , ref to $25^\circ\text{C}$		17		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}$ $T_J = 25^\circ\text{C}$			1.0	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = 12\text{ V}$			100	nA

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 10\ \mu\text{A}$	0.65		1.1	V
Negative Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			-3.0		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 300\text{ mA}$		0.127	0.155	$\Omega$
		$V_{GS} = 3.7\text{ V}, I_D = 250\text{ mA}$		0.135	0.168	
		$V_{GS} = 3.3\text{ V}, I_D = 200\text{ mA}$		0.140	0.180	
		$V_{GS} = 2.5\text{ V}, I_D = 150\text{ mA}$		0.170	0.220	
		$V_{GS} = 1.8\text{ V}, I_D = 100\text{ mA}$		0.300	0.450	
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{ V}, I_D = 200\text{ mA}$		2.0		S
Source-Drain Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 100\text{ mA}$		0.7	1.0	V

### CHARGES & CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 15\text{ V}$		75		pF
Output Capacitance	$C_{OSS}$			34		
Reverse Transfer Capacitance	$C_{RSS}$			3.0		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 200\text{ mA}$		0.9		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.1		
Gate-to-Source Charge	$Q_{GS}$			0.2		
Gate-to-Drain Charge	$Q_{GD}$			0.1		

### SWITCHING CHARACTERISTICS, $V_{GS} = 4.5\text{ V}$ (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DD} = 15\text{ V}, I_D = 200\text{ mA}, R_G = 2\ \Omega$		4.5		ns
Rise Time	$t_r$			3.5		
Turn-Off Delay Time	$t_{d(OFF)}$			9.0		
Fall Time	$t_f$			7.0		

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.

3. Switching characteristics are independent of operating junction temperatures.

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## TYPICAL CHARACTERISTICS

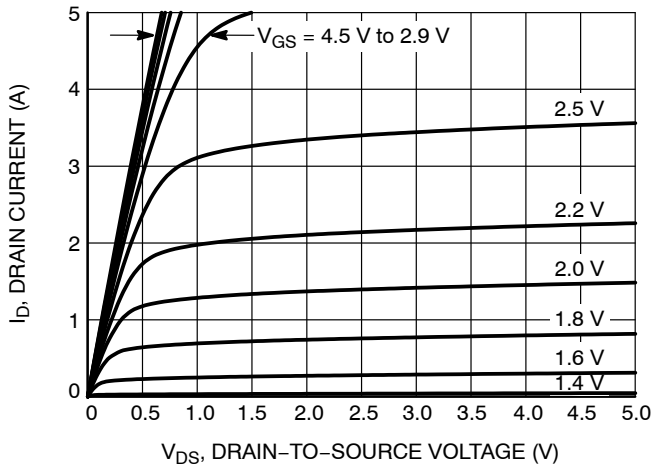


Figure 1. On-Region Characteristics

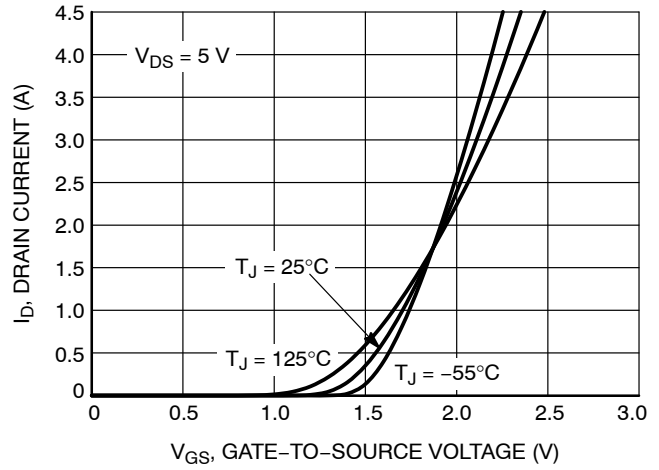


Figure 2. Transfer Characteristics

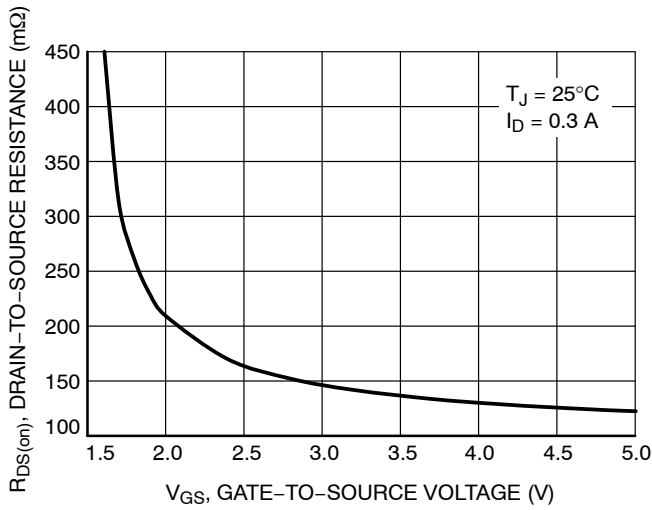


Figure 3. On-Resistance vs. Gate-to-Source Voltage

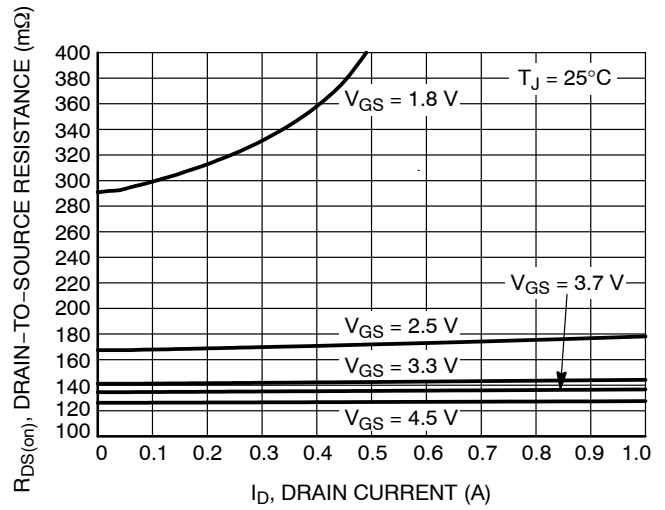


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

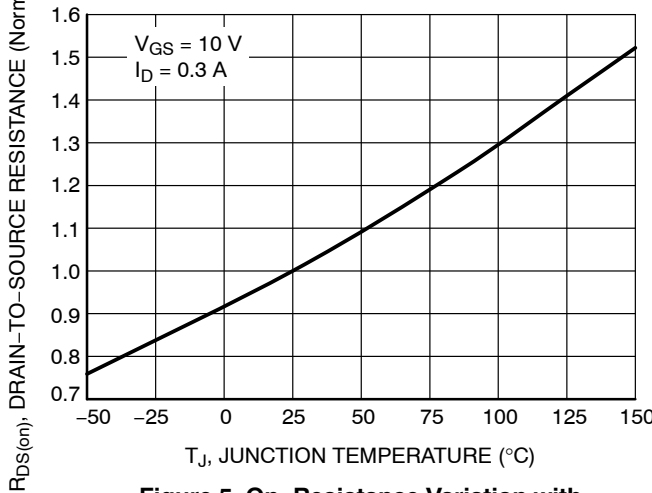


Figure 5. On-Resistance Variation with Temperature

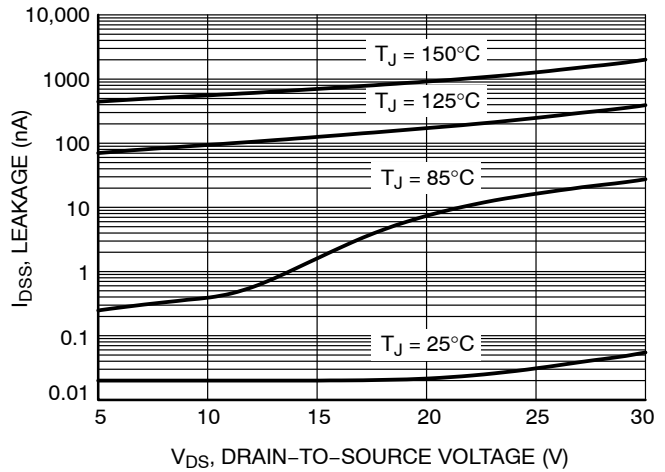


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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## TYPICAL CHARACTERISTICS

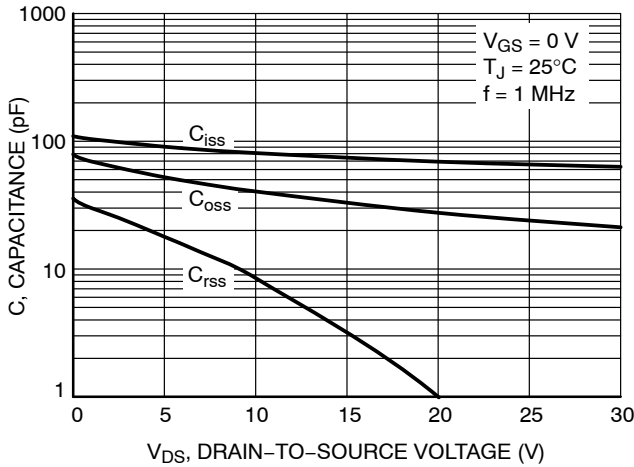


Figure 7. Capacitance Variation

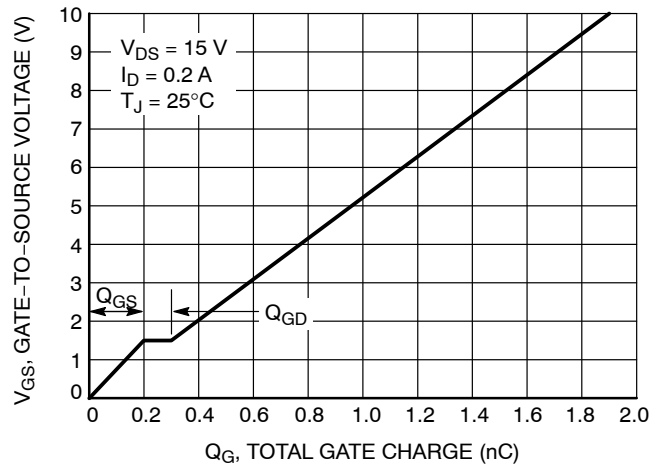


Figure 8. Gate-to-Source vs. Total Charge

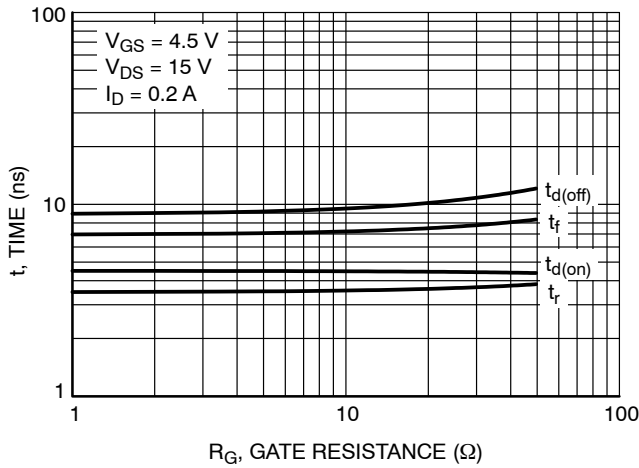


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

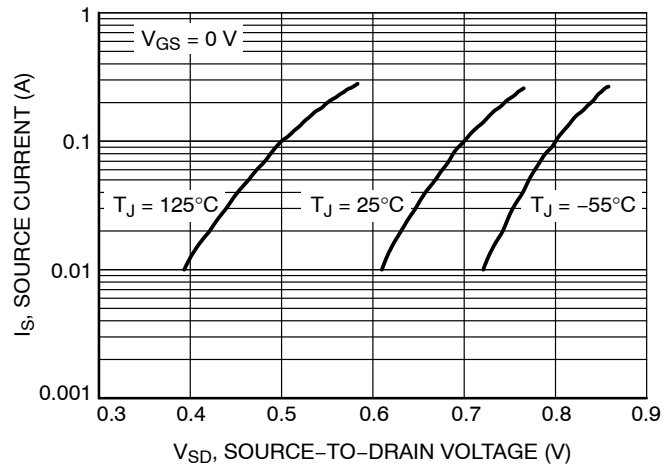


Figure 10. Diode Forward Voltage vs. Current

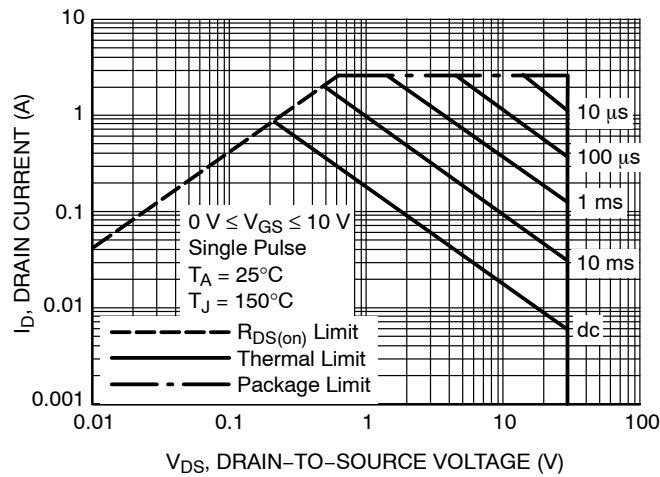


Figure 11. Safe Operating Area

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## TYPICAL CHARACTERISTICS

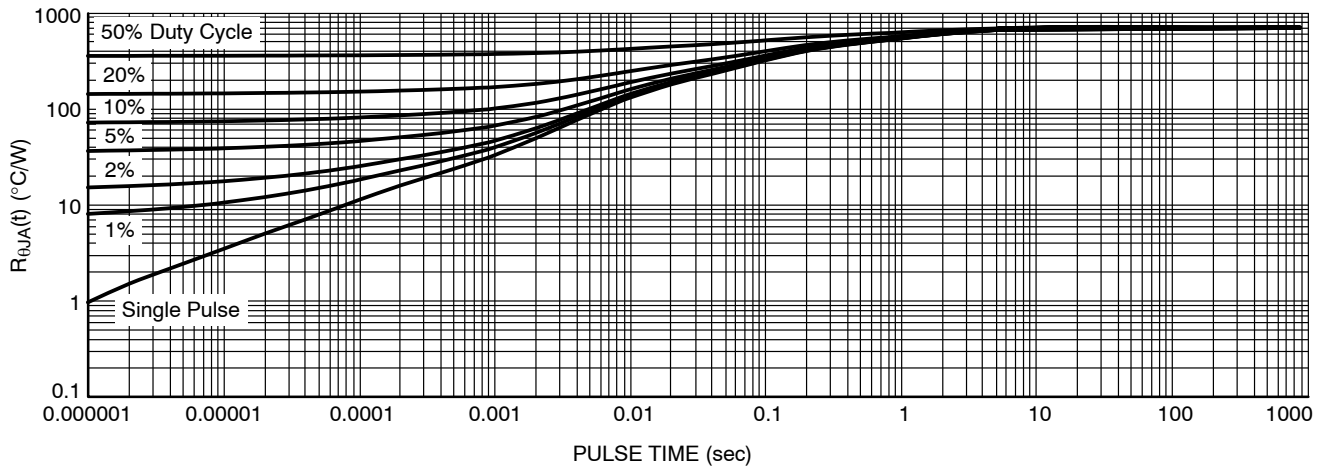


Figure 12. Thermal Characteristics

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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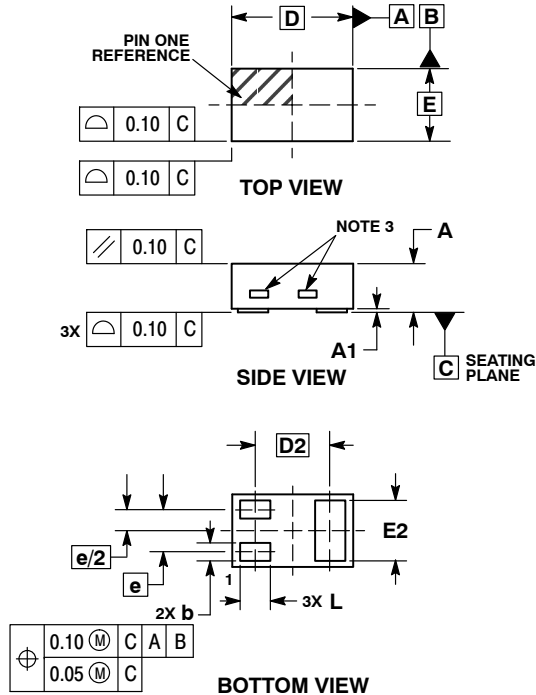


SOT-883 (XDFN3), 1.0x0.6, 0.35P  
CASE 506CB  
ISSUE A

DATE 30 MAR 2012



SCALE 8:1

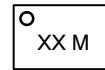


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. EXPOSED COPPER ALLOWED AS SHOWN.

MILLIMETERS		
DIM	MIN	MAX
A	0.340	0.440
A1	0.000	0.030
b	0.075	0.200
D	0.950	1.075
D2	0.620 BSC	
e	0.350 BSC	
E	0.550	0.675
E2	0.425	0.550
L	0.170	0.300

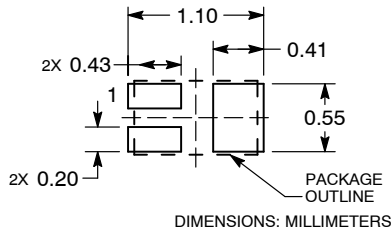
**GENERIC MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

**RECOMMENDED SOLDER FOOTPRINT\***



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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