FDMC8032L

Dual N-Channel PowerTrench® MOSFET

40 V, 7 A, 20 mΩ

ON Semiconductor®

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General Description

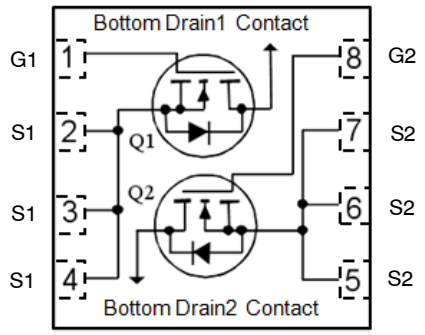
This device includes two 40 V N−Channel MOSFETs in a dual Power 33 (3 mm x 3 mm MLP) package. The package is enhanced for exceptional thermal performance.

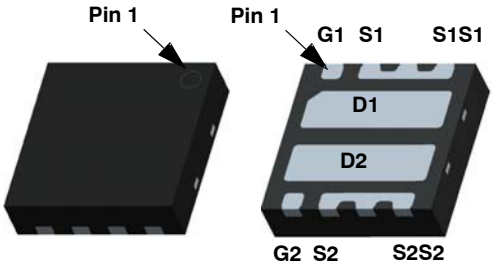
Features

- Max $r_{DS(on)}$ = 20 mΩ at V_{GS} = 10 V, I_D = 7 A
- Max $r_{DS(on)}$ = 27 mΩ at V_{GS} = 4.5 V, I_D = 6 A
- Low Inductance Packaging Shortens Rise/Fall Times
- Lower Switching Losses
- 100% Rg Tested
- This Device is Pb−Free and is RoHS Compliant

Applications

- Battery Protection
- Load Switching
- Point of Load





Power 33

WDFN8 3x3, 0.65P
CASE 511DG

MOSFET MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			40	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current – Continuous – Continuous – Pulsed	T_C = 25°C T_A = 25°C	 (Note 1a) (Note 4)	20 7 50	A
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	13	mJ
P_D	Power Dissipation Power Dissipation	T_C = 25°C T_A = 25°C	 (Note 1a)	12 1.9	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range			−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

$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&2	= Numeric Date Code
&K	= Lot Code
FDMC8032L	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	9.7	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	65	

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC8032L	FDMC8032L	Power 33	13”	12 mm	3000 Units

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
BVDSS	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		23		mV/°C
IDSS	Zero Gate Voltage Drain Current	V_{DS} = 32 V, V_{GS} = 0 V			1	μA
IGSS	Gate to Source Leakage Current, Forward	V_{GS} = ±20 V, V_{DS} = 0 V			100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C		–5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 7 A		16	20	mΩ
		V_{GS} = 4.5 V, I_D = 6 A		21	27	
		V_{GS} = 10 V, I_D = 7 A, T_J = 125°C		23	29	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 7 A		27		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 20 V, V_{GS} = 0 V f = 1 MHz		513	720	pF
C_{oss}	Output Capacitance			137	195	pF
C_{rss}	Reverse Transfer Capacitance			9.3	15	pF
R_g	Gate Resistance		0.1	2.6	3.6	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 20 V, I_D = 7 A V_{GS} = 10 V, R_{GEN} = 6 Ω		5.5	11	ns
t_r	Rise Time			1.2	10	ns
$t_{d(off)}$	Turn–Off Delay Time			13	24	ns
t_f	Fall Time			1.3	10	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V		7.6	11	nC
	Total Gate Charge	V_{GS} = 0 V to 4.5 V		3.6	5.1	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 20 V I_D = 7 A		1.5		nC
Q_{gd}	Gate to Drain “Miller” Charge			1.0		nC

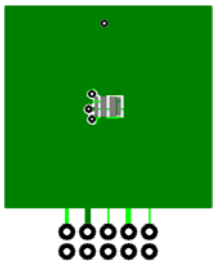
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (continued)

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
DRAIN−SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 7 A (Note 2)		0.85	1.3	V
		V_{GS} = 0 V, I_S = 1.4 A (Note 2)		0.75	1.2	
t_{rr}	Reverse Recovery Time	I_F = 7 A, di/dt = 100 A/μs		16	29	ns
Q_{rr}	Reverse Recovery Charge			3.9	10	nC

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.

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR−4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 65°C/W when mounted on a 1 in^2 pad of 2 oz copper

b. 155°C/W when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 13 mJ is based on starting T_J = 25°C, L = 3 mH, I_{AS} = 3 A, V_{DD} = 40 V, V_{GS} = 10 V. 100% tested at L = 0.1 mH, I_{AS} = 11 A.
4. Pulse Id refers to Figure.11 Forward Bias Safe Operation Area.

TYPICAL CHARACTERISTICS

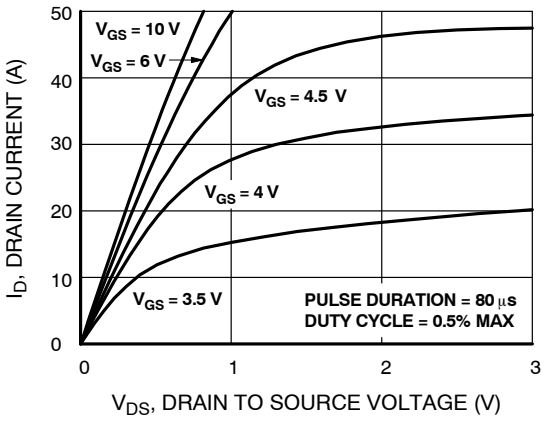


Figure 1. On−Region Characteristics

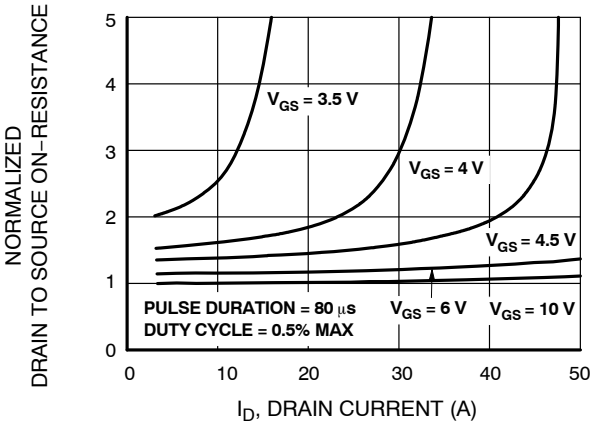


Figure 2. Normalized On−Resistance vs Drain Current and Gate Voltage

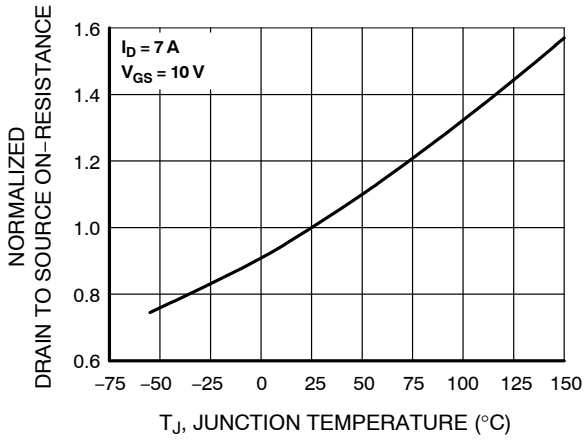


Figure 3. Normalized On−Resistance vs Junction Temperature

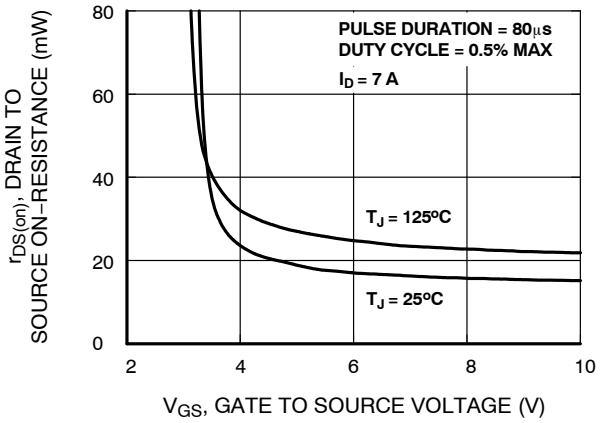


Figure 4. On−Resistance vs Gate to Source Voltage

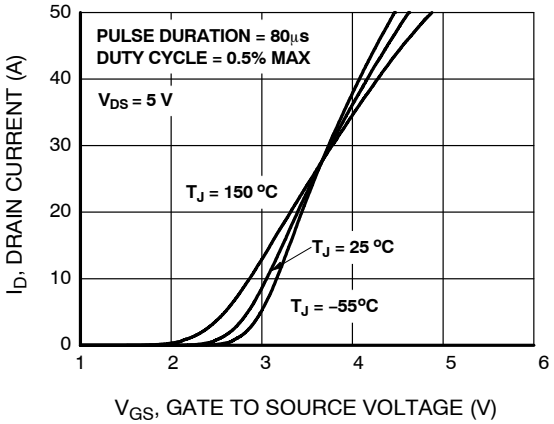


Figure 5. Transfer Characteristics

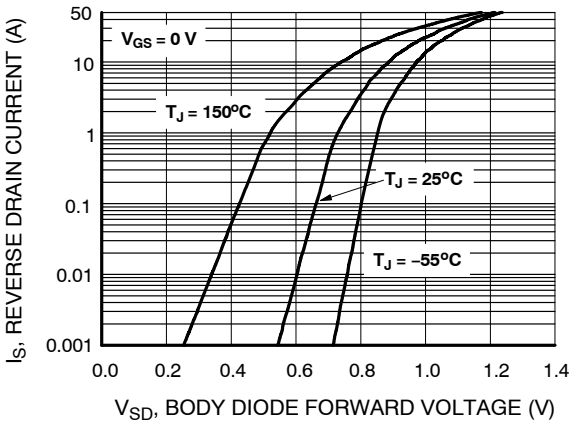


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS (continued)

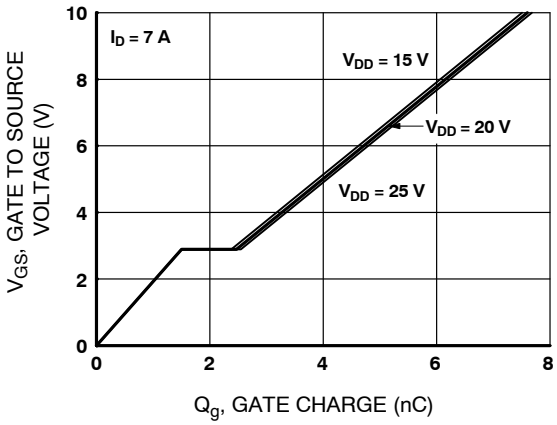


Figure 7. Gate Charge Characteristics

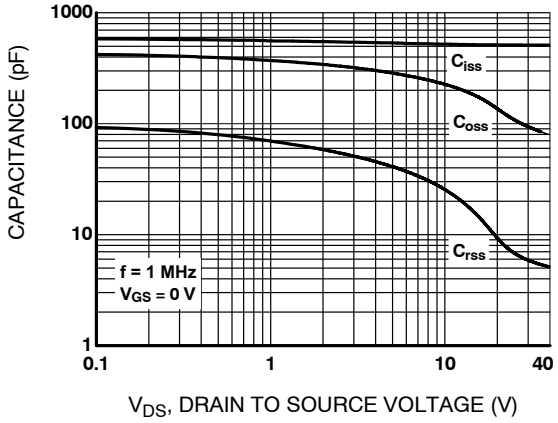


Figure 8. Capacitance vs Drain to Source Voltage

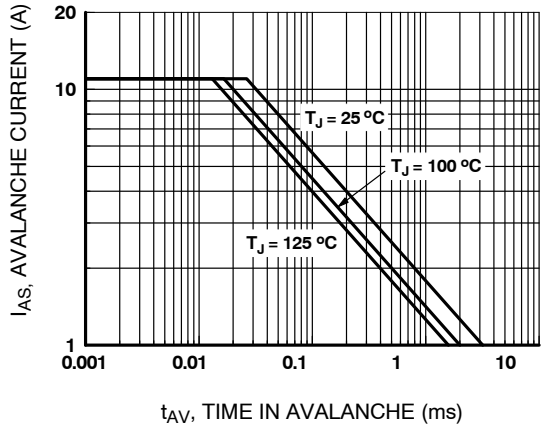


Figure 9. Unclamped Inductive Switching Capability

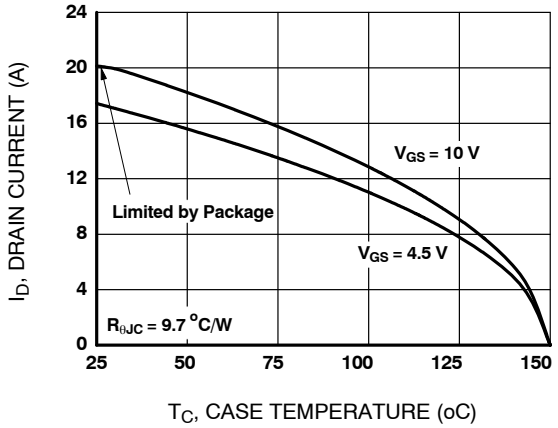


Figure 10. Maximum Continuous Drain Current vs Case Temperature

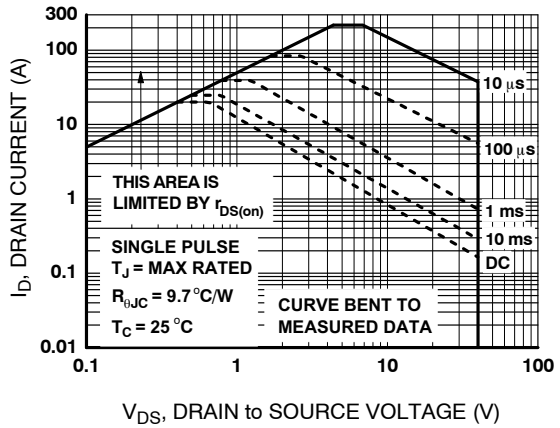


Figure 11. Forward Bias Safe Operating Area

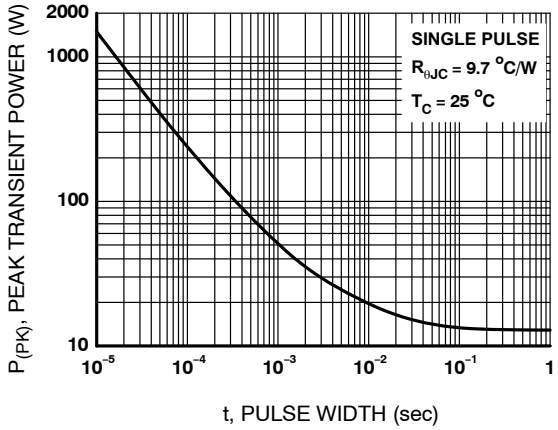


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

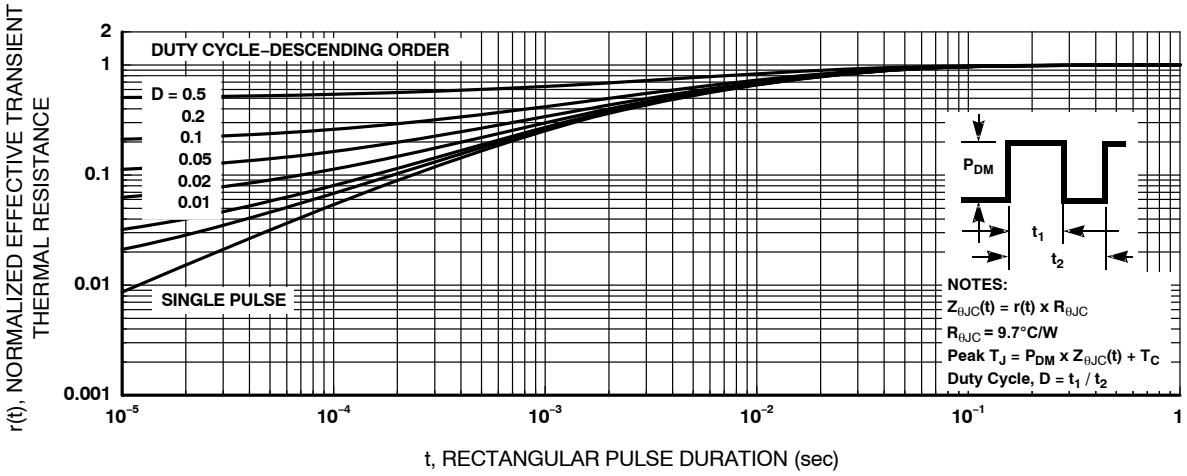


Figure 13. Transient Thermal Response Curve

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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CASE 511DG
ISSUE A

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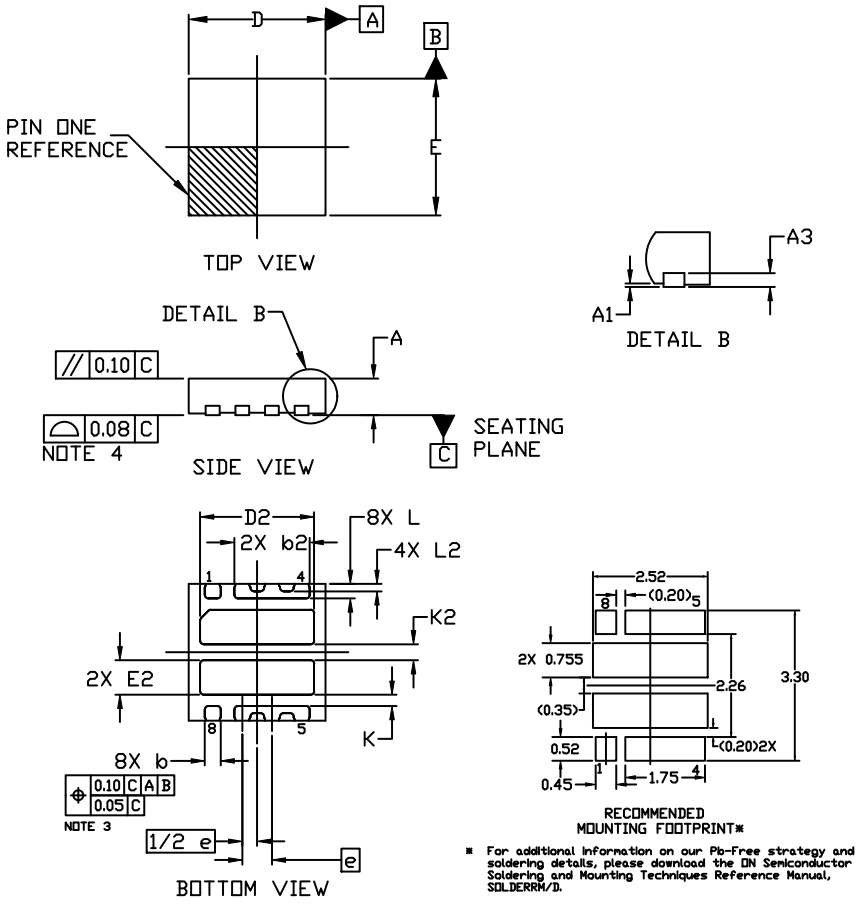

* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO PLATED TERMINALS AND IS MEASURED BETWEEN 0.15 AND 0.30MM FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	---	0.05
A3		0.20 REF	
b	0.30	0.35	0.40
b2		1.65 REF	
D	2.90	3.00	3.10
D2	2.45	2.50	2.55
E	2.90	3.00	3.10
E2	1.40	1.50	1.60
e		0.65 BSC	
K	0.25	---	---
K2		0.35 REF	
L	0.27	0.32	0.37
L2		0.163 REF	

GENERIC MARKING DIAGRAM*

XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	**WDFN8 3x3, 0.65P**		**PAGE 1 OF 1**

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