60V DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

NEW PRODUCT

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)\ max}$	I_D T_C = +25°C
-60V	55mΩ @ V_{GS} = -10V	-11.3A
	70mΩ @ V_{GS} = -4.5V	-9.1A

Description

This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

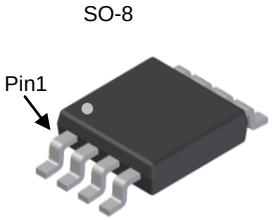
- DC-DC Converters
- Power Management Functions
- Backlighting

Features

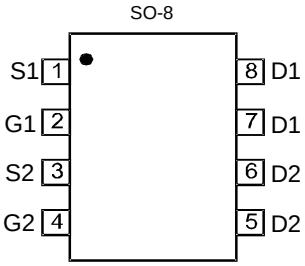
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

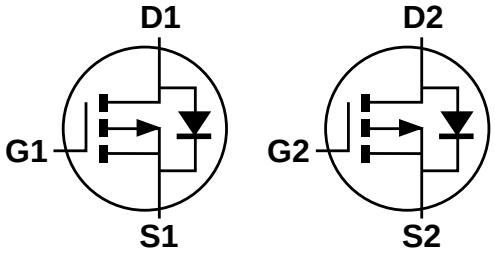
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.076 grams (Approximate)



Top View



Top View
Pin Configuration



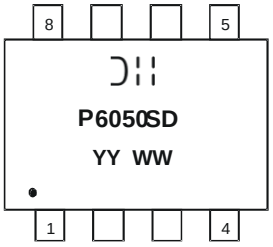
Equivalent Circuit

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP6050SSD-13	SO-8	2500 / Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http"//www.diodes.com/products/packages.html.

Marking Information



= Manufacturer's Marking
P6050SD = Product Type Marking Code
YYWW = Date Code Marking
YY or YY = Year (ex: 14 = 2014)
WW = Week (01 - 53)

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	-60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = -10V	T_C = +25°C T_C = +70°C	I_D	-11.3 -9.1	A
	T_A = +25°C T_A = +70°C	I_D	-4.8 -3.9	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)		I_{DM}	-32	A
Maximum Continuous Body Diode Forward Current (Note 6)		I_S	-2.8	A
Avalanche Current (Note 7) L = 0.1mH		I_{AS}	-24.8	A
Avalanche Energy (Note 7) L = 0.1mH		E_{AS}	30.8	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.2	W
	T_A = +70°C		0.9	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	104	°C/W
	t<10s		45	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.7	W
	T_A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	72	°C/W
	t<10s		37	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	13	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	-3.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	36	55	mΩ	V_{GS} = -10V, I_D = -5A
		-	47	70		V_{GS} = -4.5V, I_D = -4A
Diode Forward Voltage	V_{SD}	-	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	-	1293	-	pF	V_{DS} = -30V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	86.3	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	64.7	-	pF	
Gate Resistance	R_g	-	12	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	-	11.9	-	nC	V_{DS} = -30V, I_D = -5A
Total Gate Charge (V_{GS} = -10V)	Q_g	-	24	-	nC	
Gate-Source Charge	Q_{gs}	-	3.6	-	nC	
Gate-Drain Charge	Q_{gd}	-	5.7	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	4.3	-	ns	V_{GS} = -10V, V_{DS} = -30V, R_G = 3Ω, I_D = -5A
Turn-On Rise Time	t_r	-	6.3	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	46.7	-	ns	
Turn-Off Fall Time	t_f	-	25.3	-	ns	
Body Diode Reverse Recovery Time	t_{rr}	—	13.6	—	ns	I_F = -5A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	—	7.4	—	nC	I_F = -5A, di/dt = 100A/µs

Notes: 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

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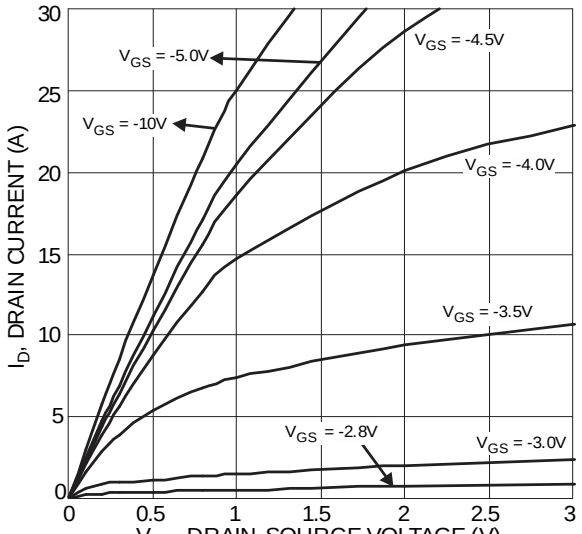

Figure 1 Typical Output Characteristic

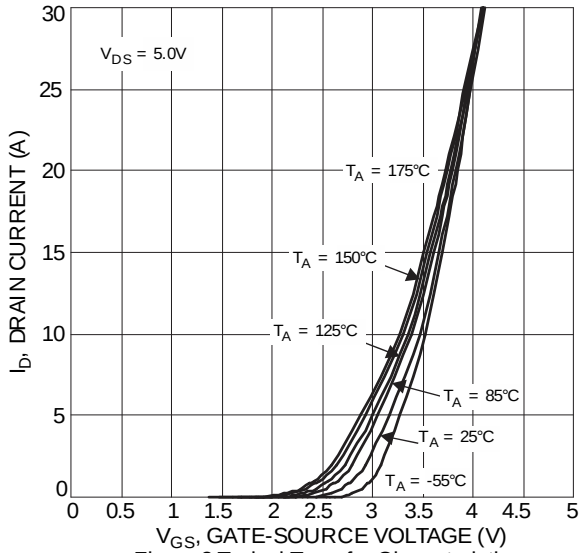

Figure 2 Typical Transfer Characteristics

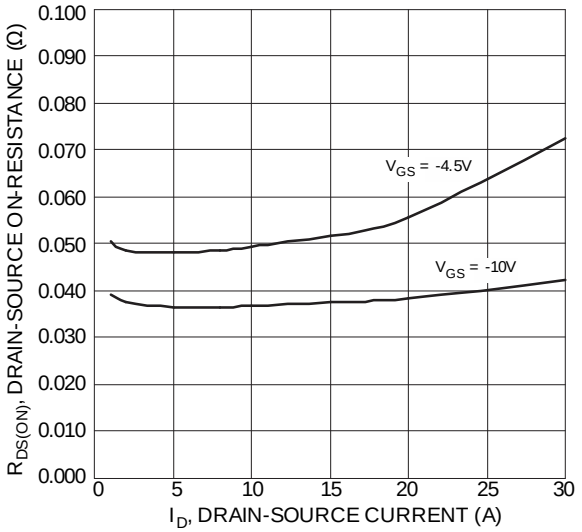

Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

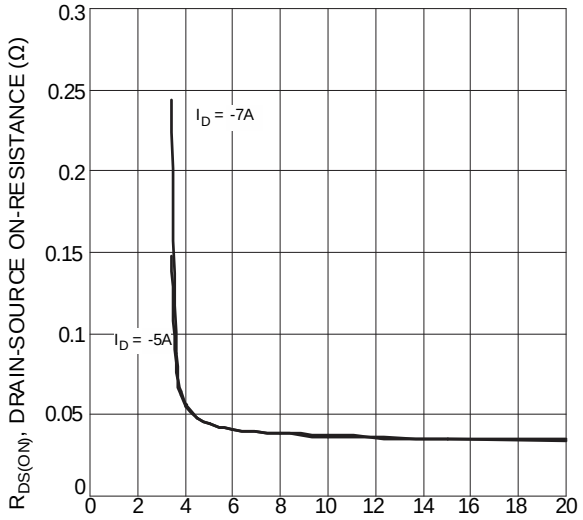

Figure 4 Typical Transfer Characteristics

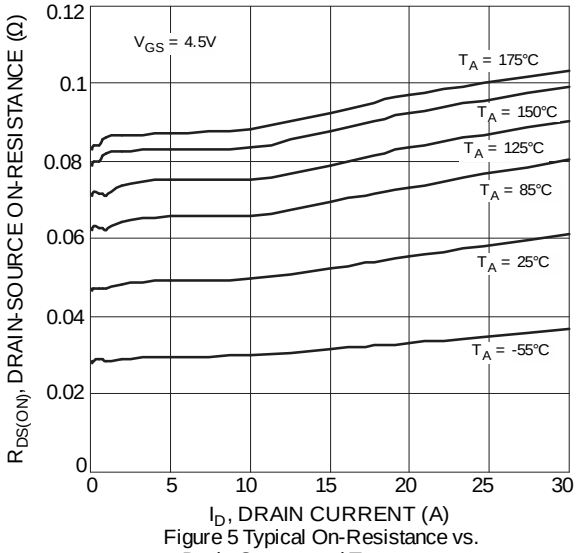

Figure 5 Typical On-Resistance vs. Drain Current and Temperature

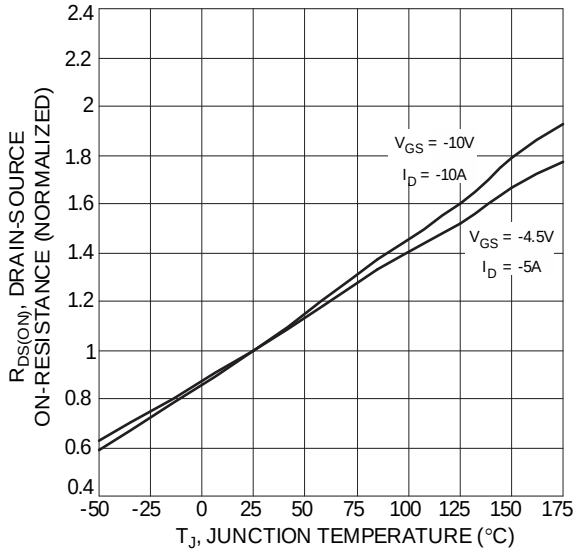

Figure 6 On-Resistance Variation with Temperature

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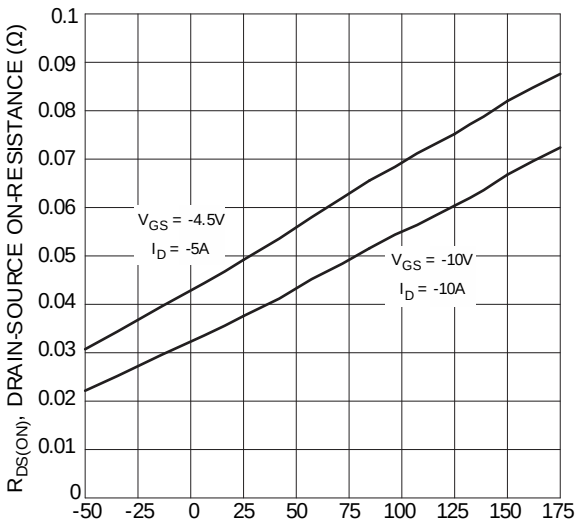

Figure 7 On-Resistance Variation with Temperature

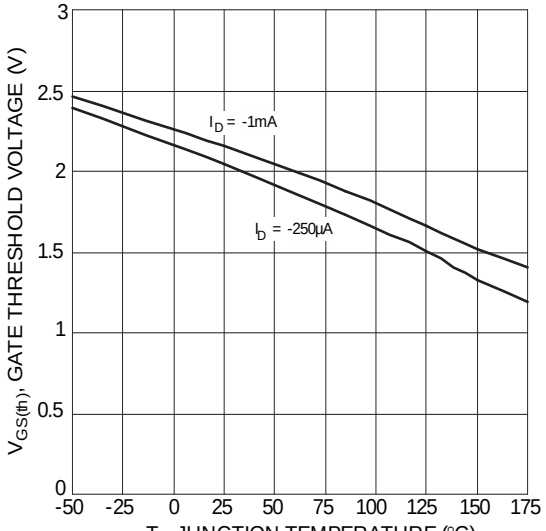

Figure 8 Gate Threshold Variation vs. Ambient Temperature

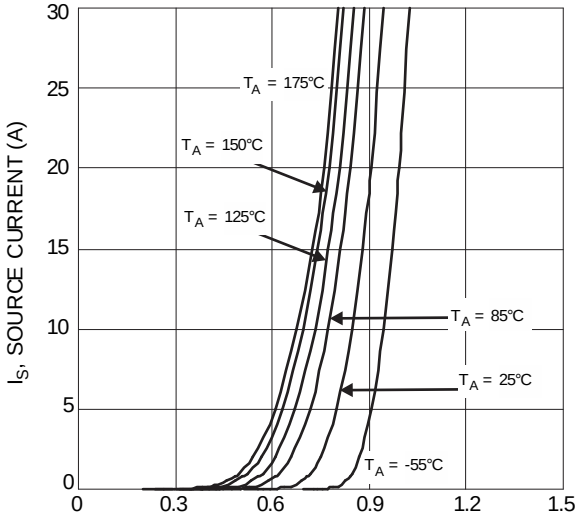

Figure 9 Diode Forward Voltage vs. Current

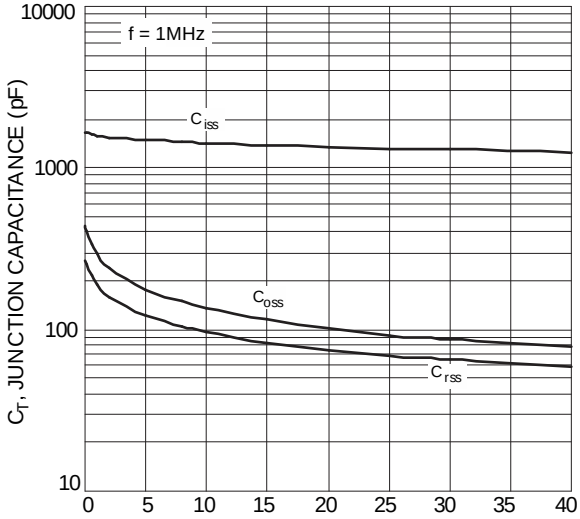

Figure 10 Typical Junction Capacitance

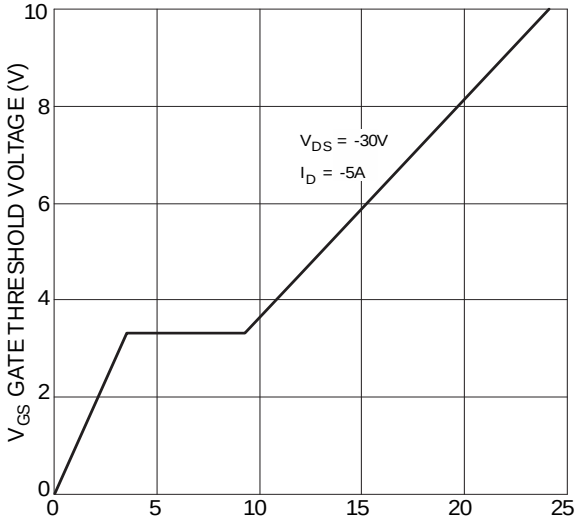

Figure 11 Gate Charge

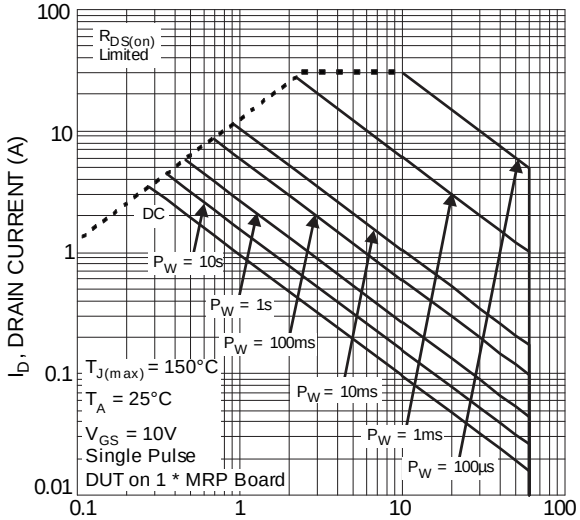

Figure 12 SOA, Safe Operation Area

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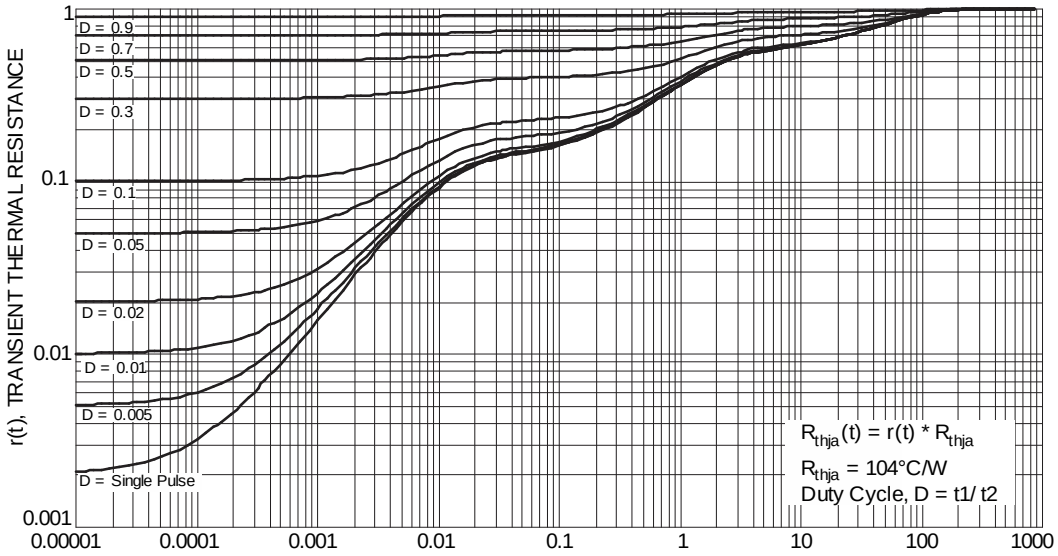
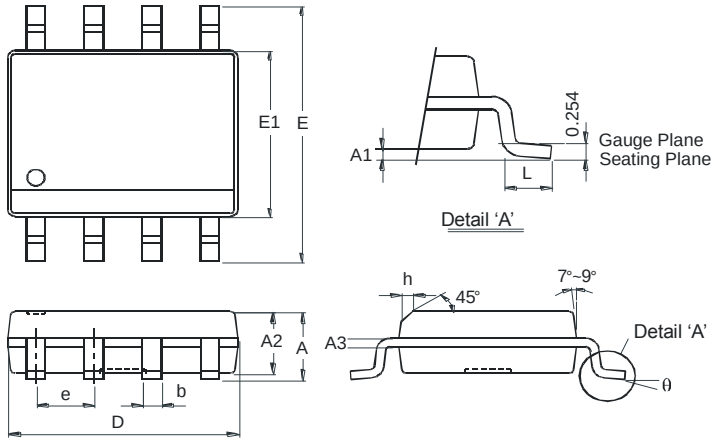


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

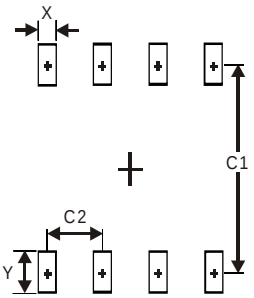
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SO-8		
Dim	**Min**	**Max**
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°
All Dimensions in mm		

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27

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