



THE DATASHEET OF DMP22M2UPS-13



Product Summary

BV _{DSS}	R _{DS(ON)} max	I _D T _C = +25°C
-20V	2.5mΩ @ V _{GS} = -10V	-60A
	3.5mΩ @ V _{GS} = -4.5V	-60A

Description

This new generation P-Channel Enhancement Mode MOSFET is designed to minimize R_{DS(ON)} and yet maintain superior switching performance.

Applications

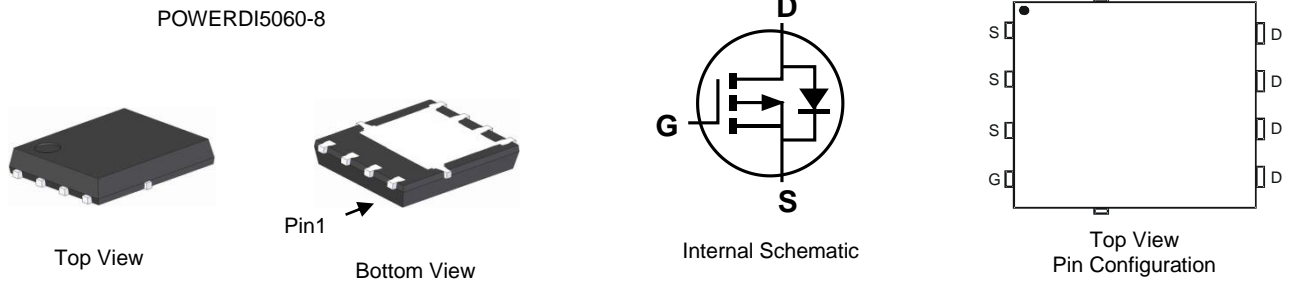
- Load Switch
- Notebook Battery Power Management

Features

- Thermally Efficient Package – Cooler Running Applications
- High Conversion Efficiency
- Low R_{DS(ON)} – Minimizes On State Losses
- <1.1mm Package Profile – Ideal for Thin Applications
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: POWERDI5060-8
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208(Ⓔ)
- Weight: 0.097 grams (Approximate)

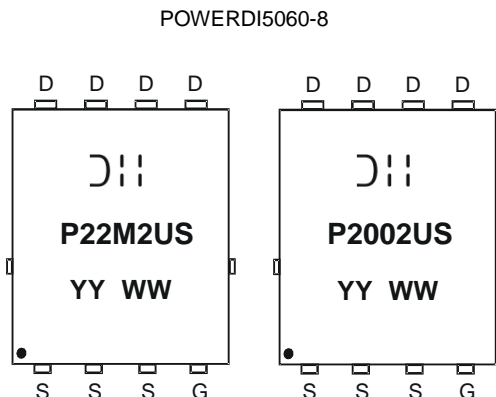


Ordering Information (Note 4)

Part Number	Case	Packaging
DMP22M2UPS-13	POWERDI5060-8	2,500 / Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 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
 P22M2US or P2002US = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 14 = 2014)
 WW = Week Code (01 to 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage			V _{GSS}	±12	V
Continuous Drain Current, V _{GS} = 10V (Note 5)	Steady State (Note 6)	T _C = +25°C T _C = +70°C	I _D	-60 -60	A
	t < 10s	T _A = +25°C T _A = +70°C		-42 -33.5	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	-100	A
Continuous Body Diode Forward Current (Note 5)	Steady State (Note 6)	T _C = +25°C	I _S	-60	A
	t < 10s	T _A = +25°C		-5.6	A
Avalanche Current, L = 0.1mH			I _{AS}	-37	A
Avalanche Energy, L = 0.1mH			E _{AS}	69.8	mJ

Thermal Characteristics

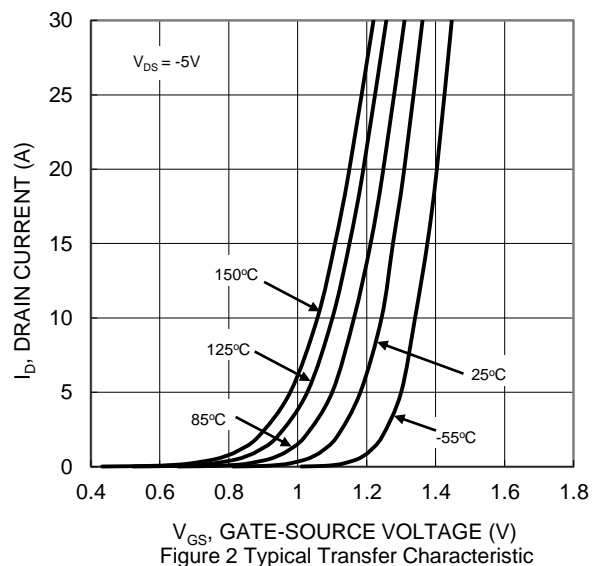
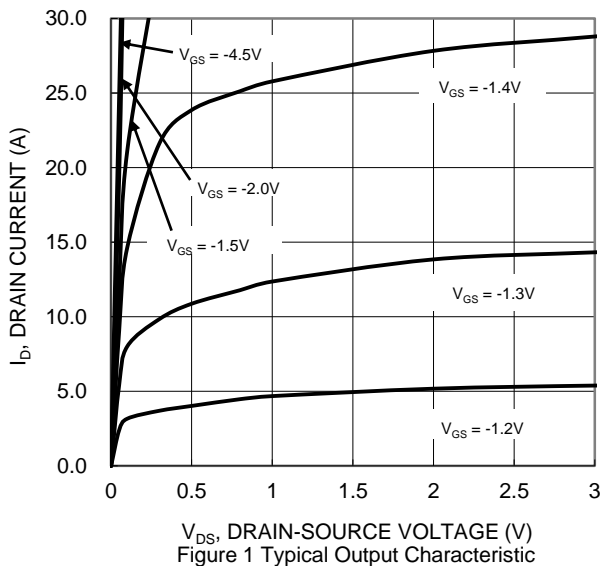
Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady State	P _D	2.3	W
	t < 10s		6.25	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	55	°C/W
	t < 10s		20	
Total Power Dissipation (Note 5)	Steady State	P _D	104	W
Thermal Resistance, Junction to Case (Note 5)		R _{θJC}	0.9	°C/W
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

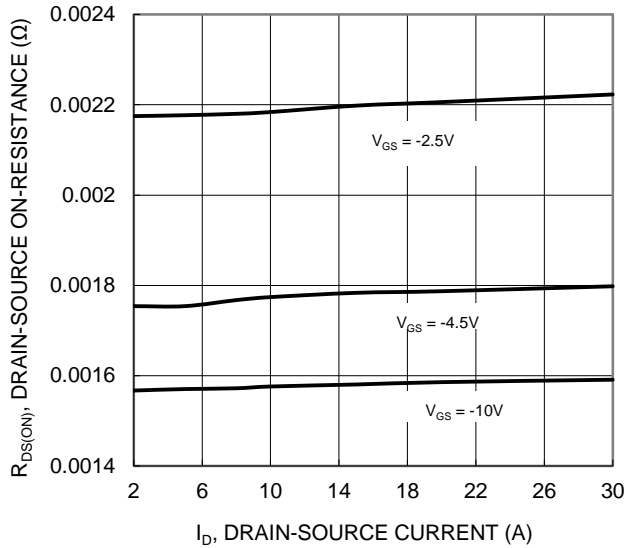
Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
6. Package limited.

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

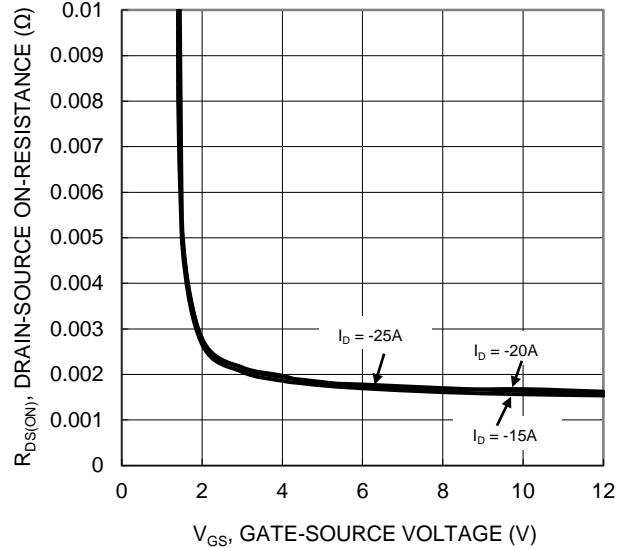
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-10	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	-0.5	—	-1.4	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	2.5	mΩ	V _{GS} = -10V, I _D = -25A
		—	—	3.5		V _{GS} = -4.5V, I _D = -20A
		—	—	5.0		V _{GS} = -2.5V, I _D = -15A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	12826	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	2547	—		
Reverse Transfer Capacitance	C _{rss}	—	1924	—		
Gate Resistance	R _G	—	4.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -10V)	Q _g	—	476	—	nC	V _{DS} = -10V, I _D = -20A
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	228	—		
Gate-Source Charge	Q _{gs}	—	24.8	—		
Gate-Drain Charge	Q _{gd}	—	61.9	—		
Turn-On Delay Time	t _{D(ON)}	—	14.2	—	ns	V _{DD} = -10V, V _{GEN} = -4.5V, R _{GEN} = 1Ω, I _D = -10A
Turn-On Rise Time	t _r	—	35.4	—		
Turn-Off Delay Time	t _{D(OFF)}	—	361	—		
Turn-Off Fall Time	t _f	—	224	—		
BODY DIODE CHARACTERISTICS						
Diode Forward Voltage	V _{SD}	—	-0.58	—	V	V _{GS} = 0V, I _S = -5A
Reverse Recovery Time (Note 8)	t _{RR}	—	137	—	ns	I _F = -10A, di/dt = 100A/μs
Reverse Recovery Charge (Note 8)	Q _{rr}	—	221	—	nC	
Reverse Recovery Fall Time (Note 8)	t _a	—	39	—	ns	
Reverse Recovery Raise Time (Note 8)	t _b	—	98	—		

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

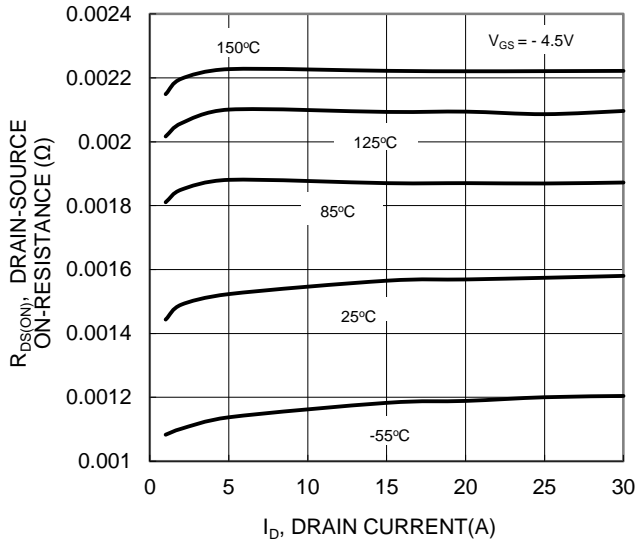




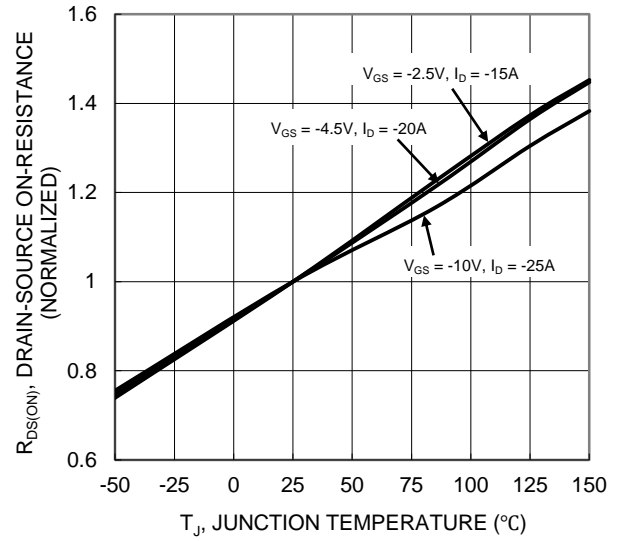
I_D , DRAIN-CURRENT (A)
Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage



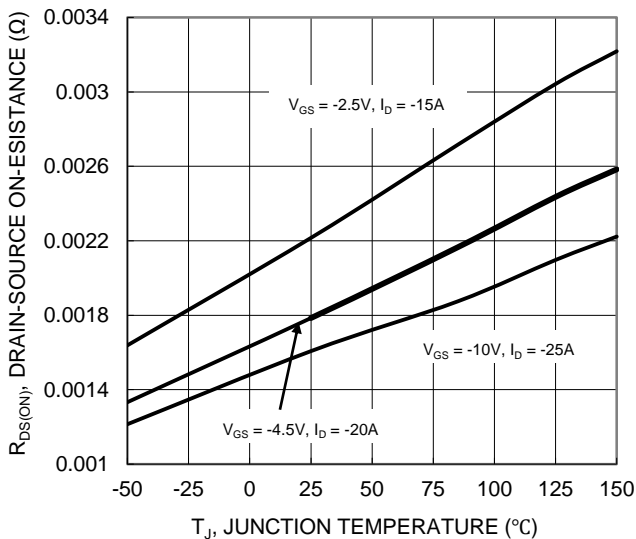
V_{GS} , GATE-SOURCE VOLTAGE (V)
Figure 4 Typical Transfer Characteristic



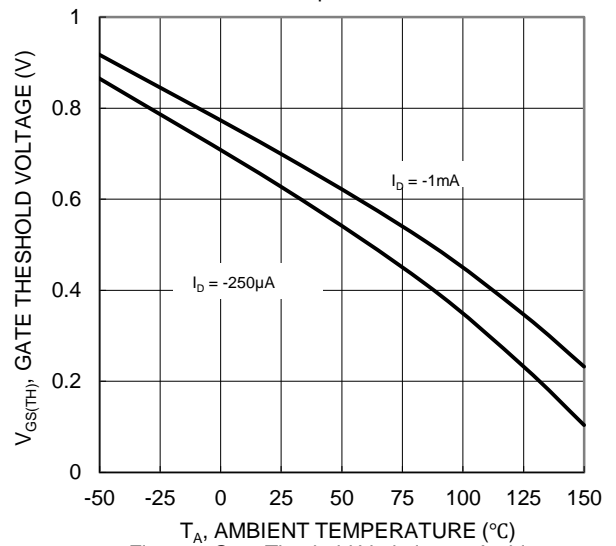
I_D , DRAIN CURRENT (A)
Figure 5 Typical On-Resistance vs. Drain Current and Temperature



T_J , JUNCTION TEMPERATURE (°C)
Figure 6 On-Resistance Variation with Temperature



T_J , JUNCTION TEMPERATURE (°C)
Figure 7 On-Resistance Variation with Temperature



T_A , AMBIENT TEMPERATURE (°C)
Figure 8 Gate Threshold Variation vs Ambient Temperature

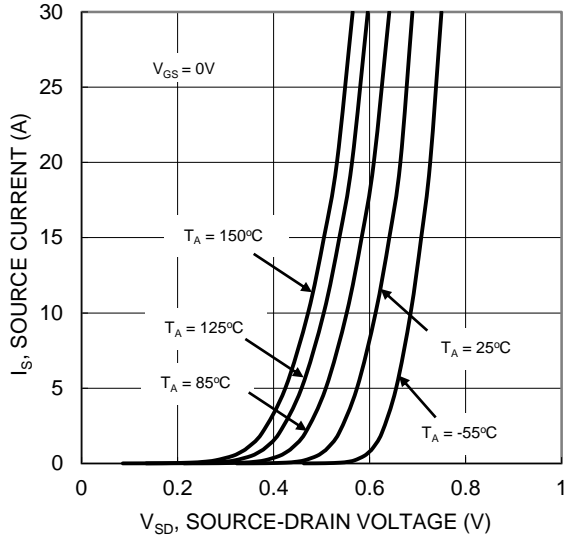


Figure 9 Diode Forward Voltage vs. Current

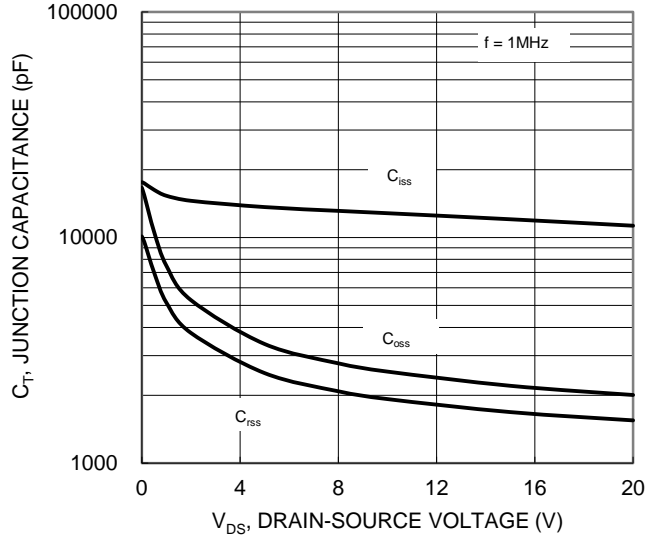


Figure 10 Typical Junction Capacitance

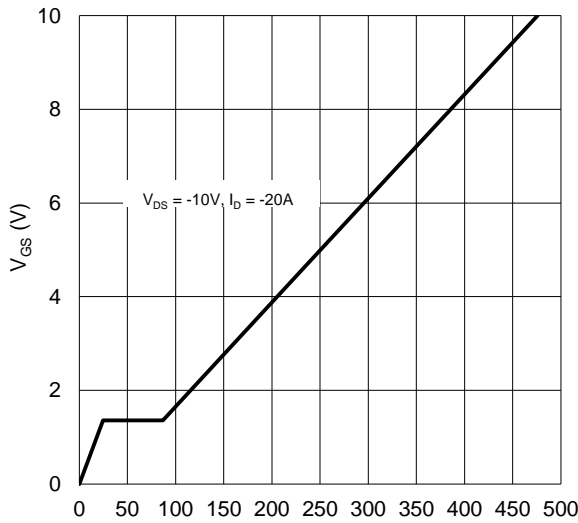


Figure 11 Gate Charge

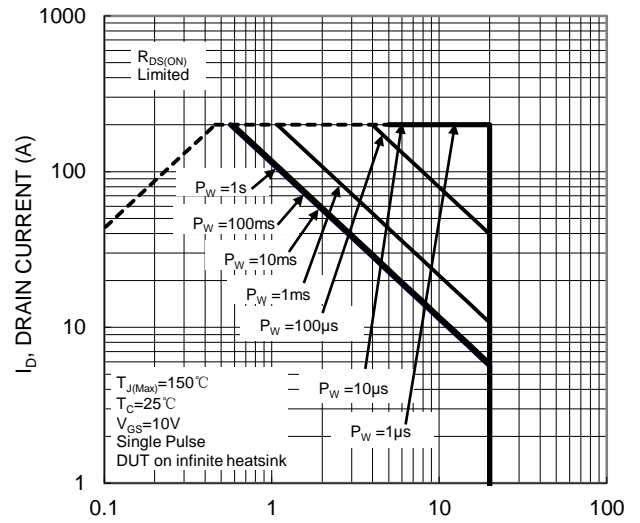


Figure 12 SOA, Safe Operation Area

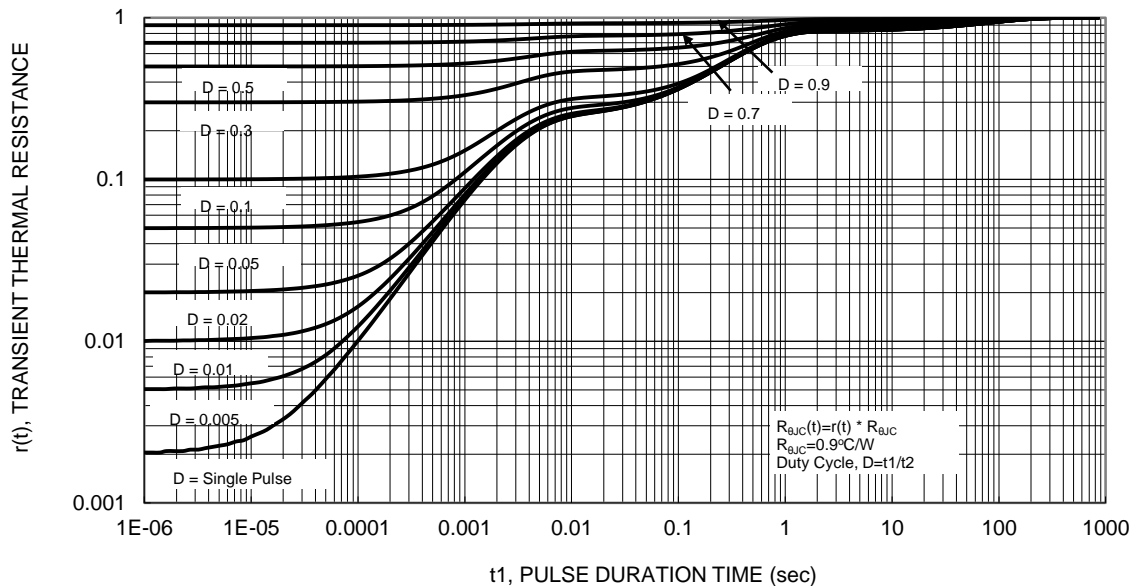


Figure 13 Transient Thermal Resistance

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