



New Product

Si5856DC

Vishay Siliconix

N-Channel 1.8-V (G-S) MOSFET With Schottky Diode

MOSFET PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
20	0.040 @ $V_{GS} = 4.5$ V	5.9
	0.045 @ $V_{GS} = 2.5$ V	5.6
	0.052 @ $V_{GS} = 1.8$ V	5.2

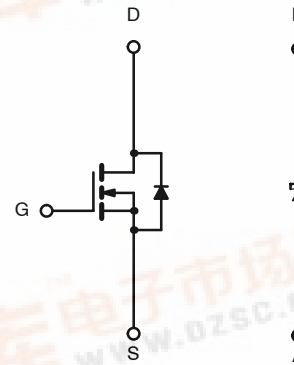
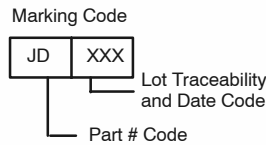
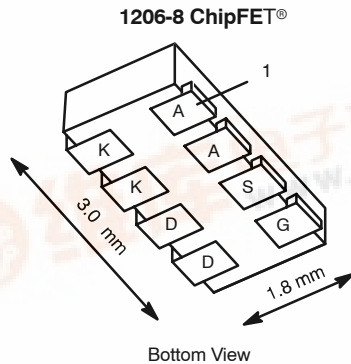
SCHOTTKY PRODUCT SUMMARY		
V_{KA} (V)	V_f (V) Diode Forward Voltage	I_F (A)
20	0.375 V @ 1.0	1.0

FEATURES

- TrenchFET® Power MOSFETS
- Ultra Low $r_{DS(on)}$
- Ultra Low V_f Schottky
- Si5853DC Pin Compatible

APPLICATIONS

- Buck Rectifier Switch, Buck-Boost
- Synchronous Rectifier or Load
- Switch For Portable Devices



Ordering Information: Si5856DC-T1

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	5 sec	Steady State	Unit	
Drain-Source Voltage (MOSFET and Schottky)	V_{DS}	20		V	
Reverse Voltage (Schottky)	V_{KA}	20			
Gate-Source Voltage (MOSFET)	V_{GS}	± 8			
Continuous Drain Current ($T_J = 150^\circ\text{C}$) (MOSFET) ^a	I_D	$T_A = 25^\circ\text{C}$	5.9	4.4	A
		$T_A = 85^\circ\text{C}$	4.2	3.1	
Pulsed Drain Current (MOSFET)	I_{DM}	20			
Continuous Source Current (MOSFET Diode Conduction) ^a	I_S	1.8	0.9		
Average Forward Current (Schottky)	I_F	1.0			
Pulsed Forward Current (Schottky)	I_{FM}	7			
Maximum Power Dissipation (MOSFET) ^a	P_D	$T_A = 25^\circ\text{C}$	2.1	1.1	W
		$T_A = 85^\circ\text{C}$	1.1	0.6	
Maximum Power Dissipation (Schottky) ^a	P_D	$T_A = 25^\circ\text{C}$	1.9	1.1	
		$T_A = 85^\circ\text{C}$	1.0	0.56	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150		$^\circ\text{C}$	
Soldering Recommendations (Peak Temperature) ^{b, c}		260			

Notes

- Surface Mounted on 1" x 1" FR4 Board.
- See Reliability Manual for profile. The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.



THERMAL RESISTANCE RATINGS						
Parameter		Device	Symbol	Typical	Maximum	Unit
Junction-to-Ambient ^a	t ≤ 5 sec	MOSFET	R _{thJA}	50	60	°C/W
		Schottky		54	65	
	Steady State	MOSFET		90	110	
		Schottky		95	115	
Junction-to-Foot	Steady State	MOSFET	R _{thJF}	30	40	
		Schottky		30	40	

Notes

a. Surface Mounted on 1" x 1" FR4 Board.

MOSFET SPECIFICATIONS (T _J = 25°C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.4		1.0	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85°C			5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	20			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 4.5 V, I _D = 4.4 A		0.032	0.040	Ω
		V _{GS} = 2.5 V, I _D = 4.1 A		0.036	0.045	
		V _{GS} = 1.8 V, I _D = 1.9 A		0.042	0.052	
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 4.4 A		22		S
Diode Forward Voltage ^a	V _{SD}	I _S = 1.0 A, V _{GS} = 0 V		0.8	1.2	V
Dynamic^b						
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 4.4 A		5	7.5	nC
Gate-Source Charge	Q _{gs}			0.85		
Gate-Drain Charge	Q _{gd}			1		
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 10 Ω I _D ≅ 1 A, V _{GEN} = 4.5 V, R _G = 6 Ω		20	30	ns
Rise Time	t _r			36	55	
Turn-Off Delay Time	t _{d(off)}			30	45	
Fall Time	t _f			12	20	
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 0.9 A, di/dt = 100 A/μs		45	90	

Notes

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%,
b. Guaranteed by design, not subject to production testing.

SCHOTTKY SPECIFICATIONS (T _J = 25°C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V _F	I _F = 1.0		0.34	0.375	V
		I _F = 1.0, T _J = 125°C		0.255	0.290	
Maximum Reverse Leakage Current	I _{rm}	V _r = 20 V		0.05	0.500	mA
		V _r = 20 V, T _J = 85°C		2	20	
		V _r = 20 V, T _J = 125°C		10	100	
Junction Capacitance	C _T	V _r = 10 V		90		pF



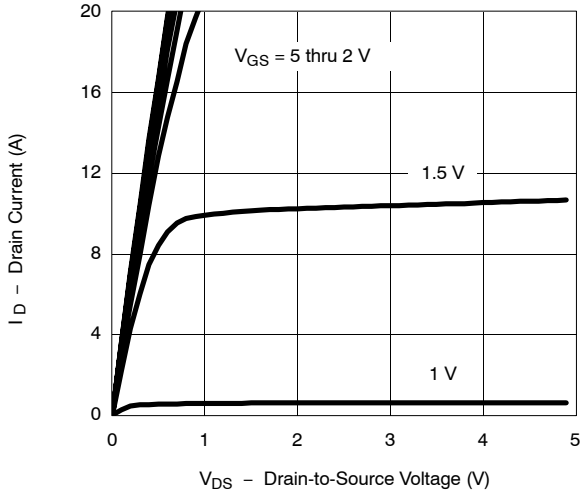
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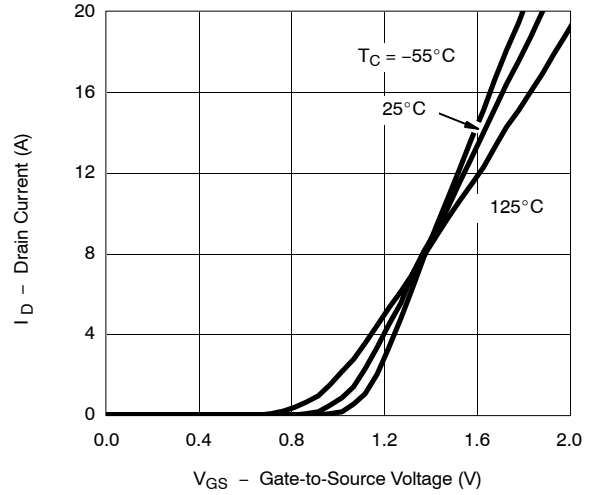
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

MOSFET

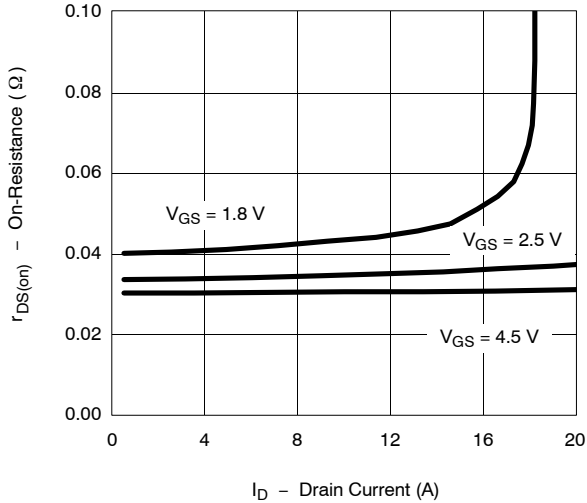
Output Characteristics



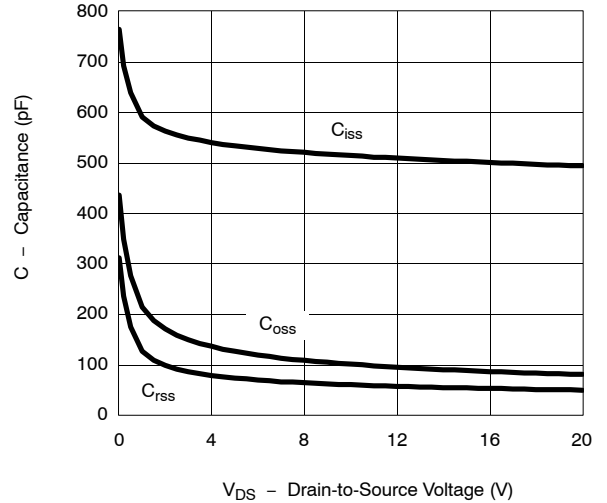
Transfer Characteristics



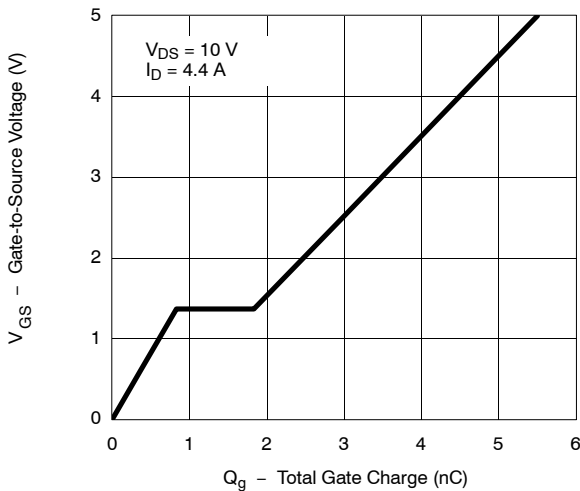
On-Resistance vs. Drain Current



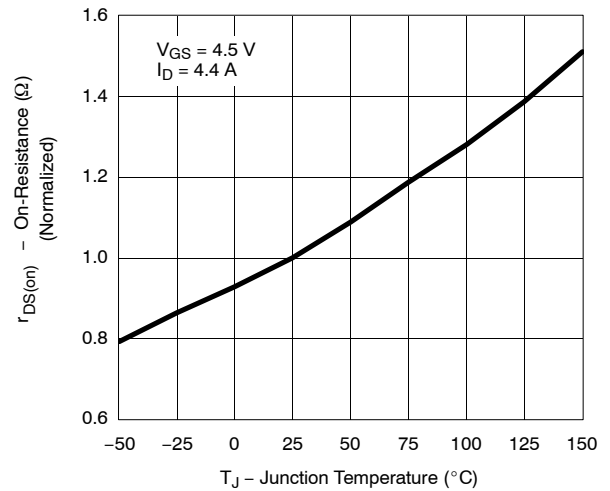
Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

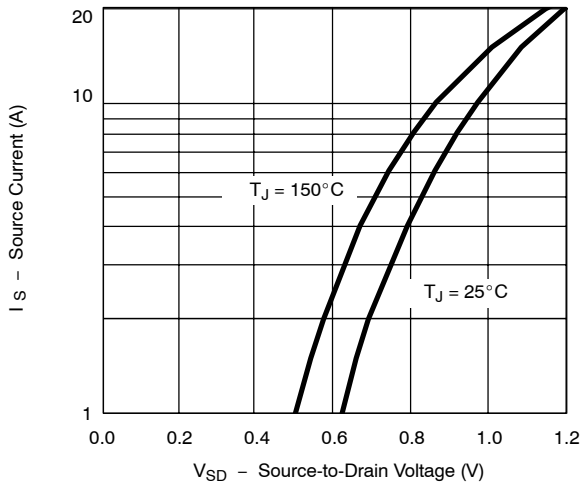




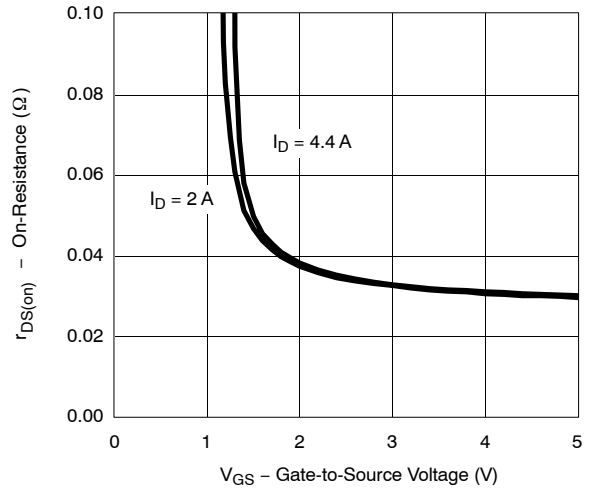
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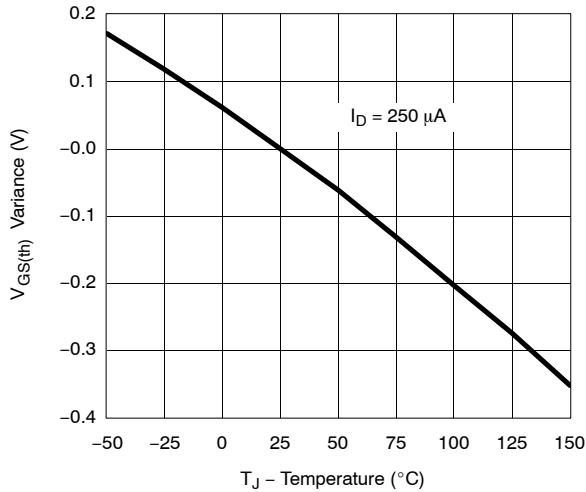
Source-Drain Diode Forward Voltage



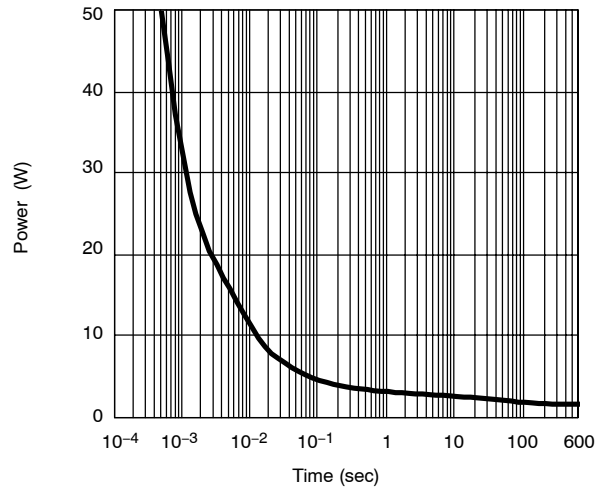
On-Resistance vs. Gate-to-Source Voltage



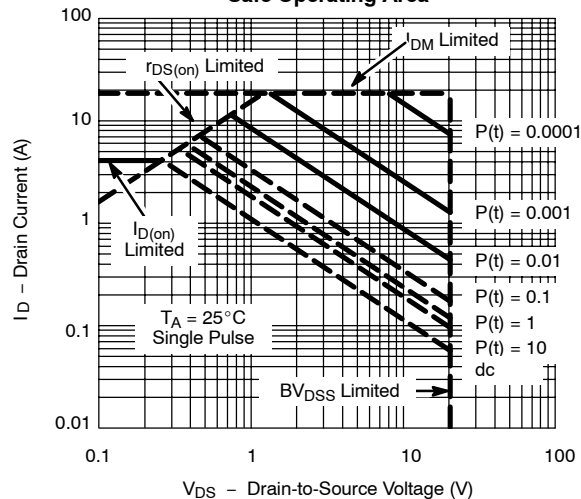
Threshold Voltage



Single Pulse Power



Safe Operating Area



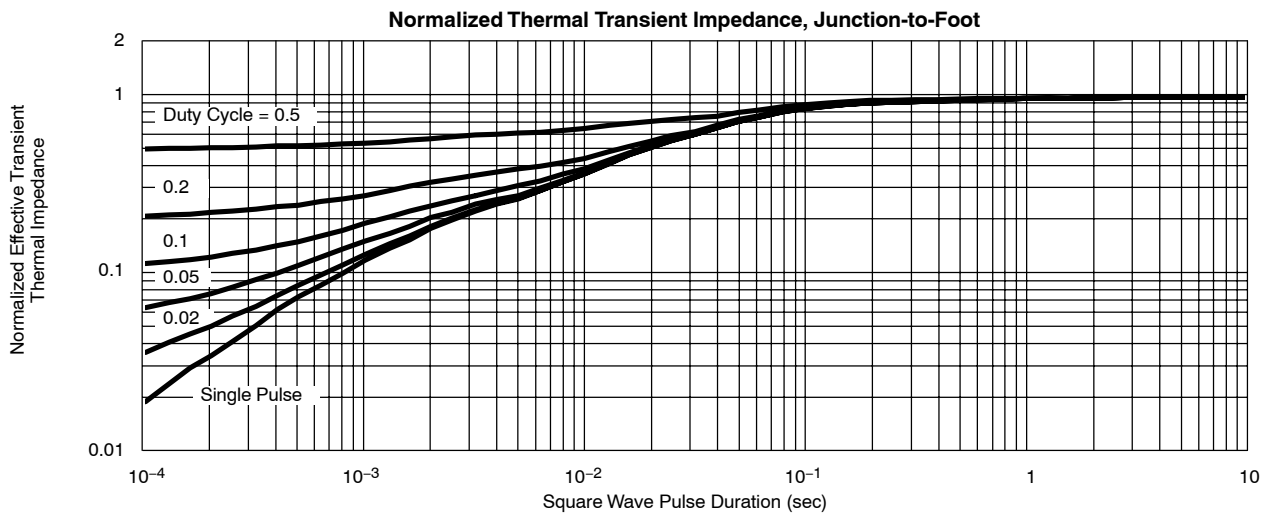
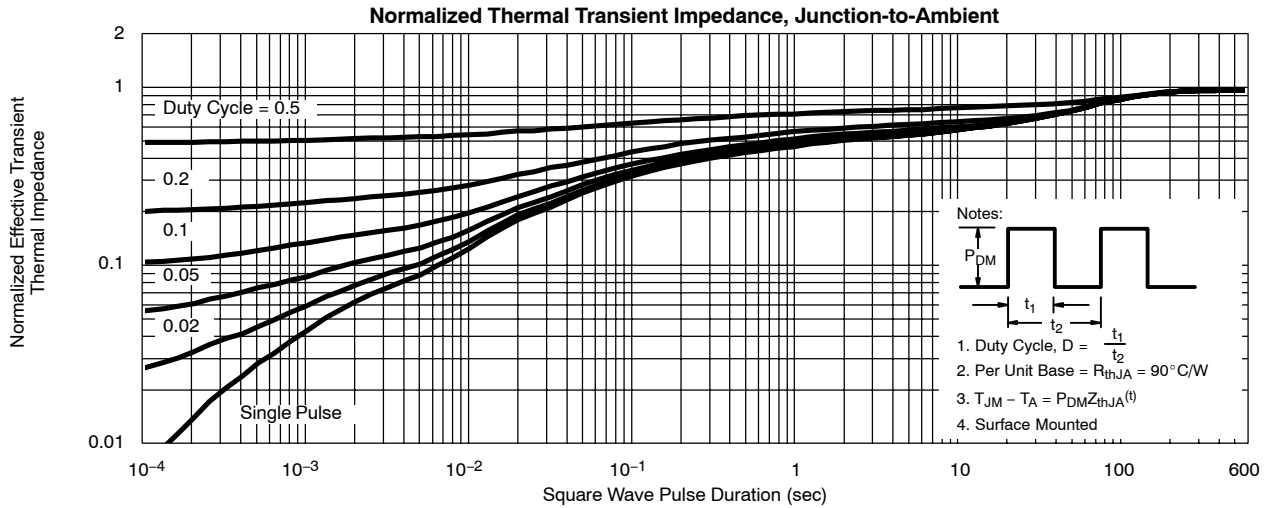


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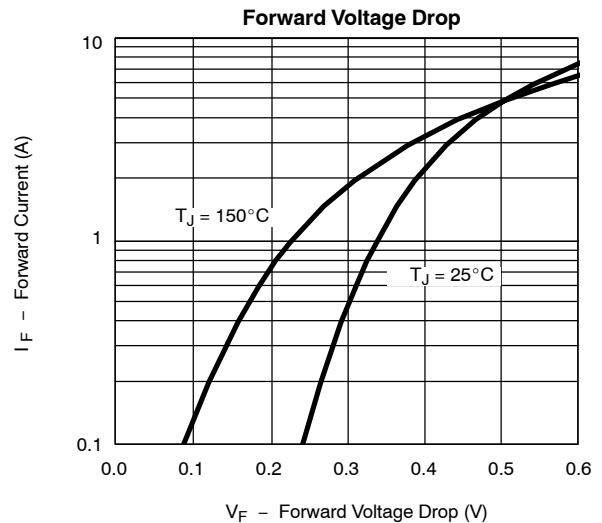
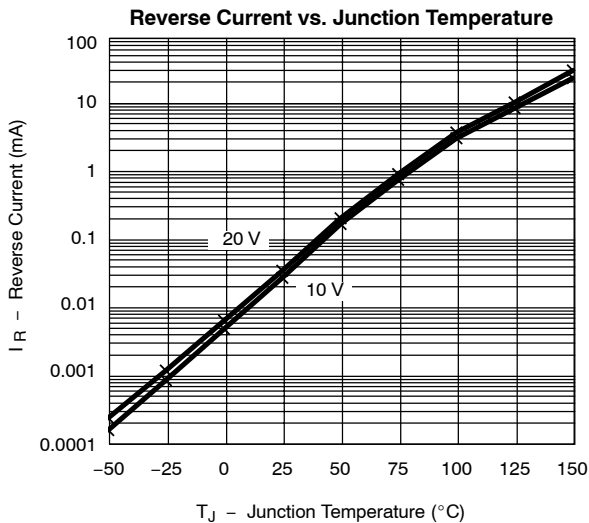
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

MOSFET



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

SCHOTTKY





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