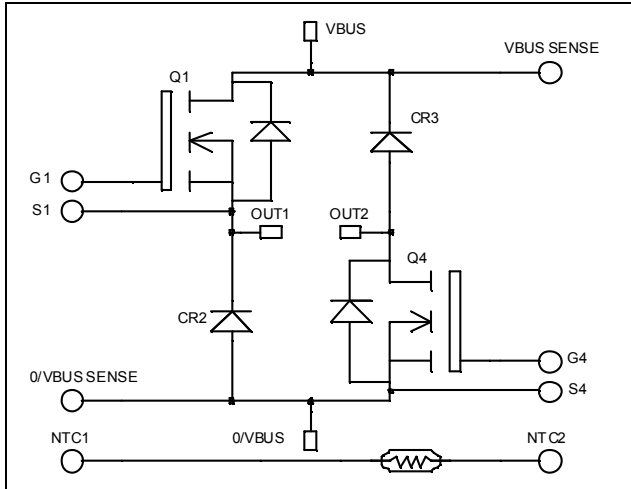


Asymmetrical - Bridge MOSFET Power Module

$V_{DSS} = 500V$
 $R_{DSon} = 75m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 46A$ @ $T_c = 25^\circ C$

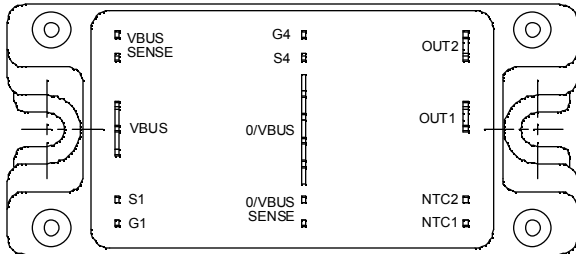


Application

- Welding converters
- Switched Mode Power Supplies
- Switched Reluctance Motor Drives

Features

- Power MOS 7[®] MOSFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration




Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- RoHS Compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	46
		$T_c = 80^\circ C$	34
I_{DM}	Pulsed Drain current	184	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	90	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	357
I_{AR}	Avalanche current (repetitive and non repetitive)	46	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	2500	


CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V$	$T_j = 25^\circ\text{C}$			100	μA
		$V_{GS} = 0V, V_{DS} = 400V$	$T_j = 125^\circ\text{C}$			500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 23A$			75	90	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$		3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$				± 100	nA

Dynamic Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C_{iss}	Input Capacitance	$V_{GS} = 0V$		5600		pF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		1200		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		90		
Q_g	Total gate Charge	$V_{GS} = 10V$		123		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 250V$		33		
Q_{gd}	Gate – Drain Charge	$I_D = 46A$		65		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C		18		ns
T_r	Rise Time	$V_{GS} = 15V$		35		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 333V$		87		
T_f	Fall Time	$I_D = 46A$ $R_G = 5\Omega$		77		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C		755		μJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 46A, R_G = 5\Omega$		726		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C		1241		μJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15V, V_{Bus} = 333V$ $I_D = 46A, R_G = 5\Omega$		846		

Diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V	
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ\text{C}$		250	μA	
			$T_j = 125^\circ\text{C}$		500		
I_F	DC Forward Current			60		A	
V_F	Diode Forward Voltage	$I_F = 60A$			1.6	1.8	V
		$I_F = 120A$			1.9		
		$I_F = 60A$	$T_j = 125^\circ\text{C}$		1.4		
t_{rr}	Reverse Recovery Time	$I_F = 60A$ $V_R = 400V$	$T_j = 25^\circ\text{C}$		130	ns	
			$T_j = 125^\circ\text{C}$		170		
Q_{rr}	Reverse Recovery Charge	$di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		220	nC	
			$T_j = 125^\circ\text{C}$		920		

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	Transistor		0.35	°C/W	
		diode		0.9		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I _{isol} < 1mA, 50/60Hz	2500			V	
T _J	Operating junction temperature range	-40		150	°C	
T _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To Heatsink	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

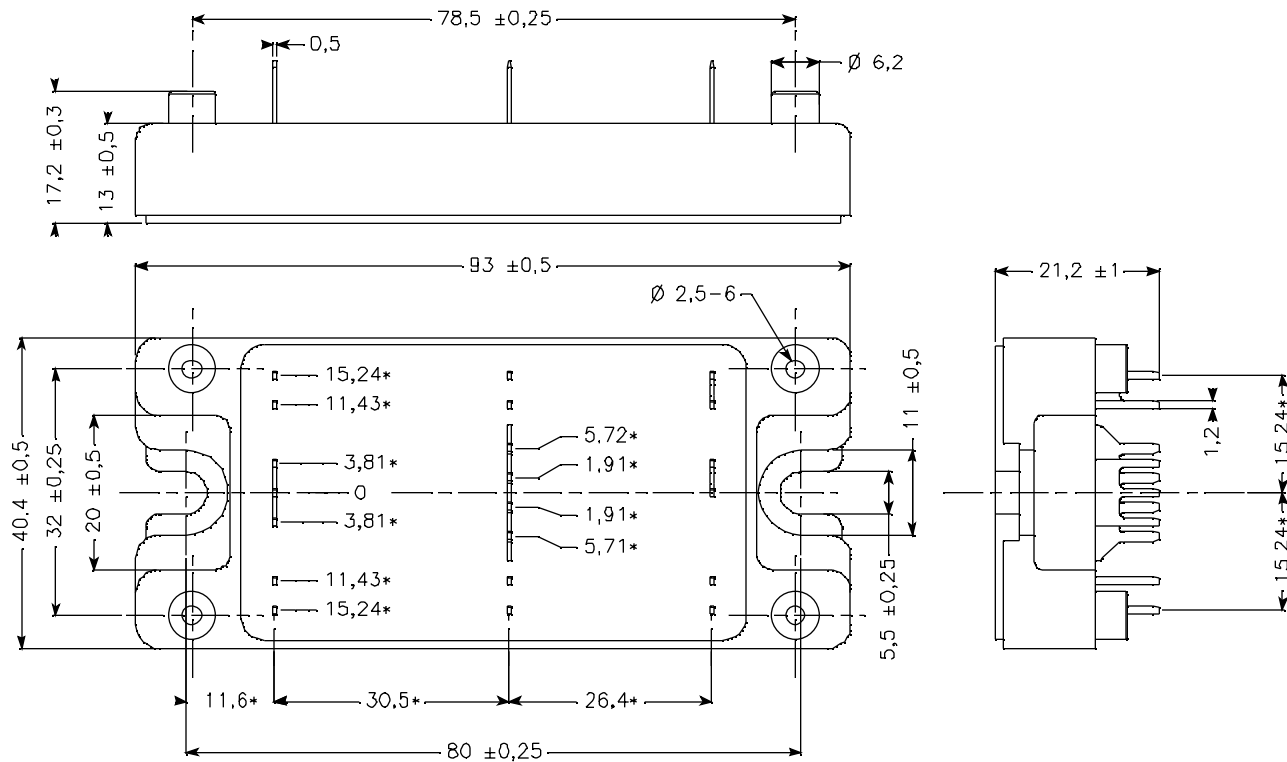
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
B _{25/85}	T ₂₅ = 298.15 K		3952		K

$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

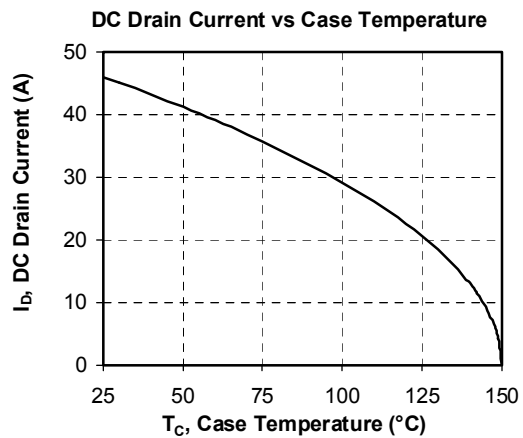
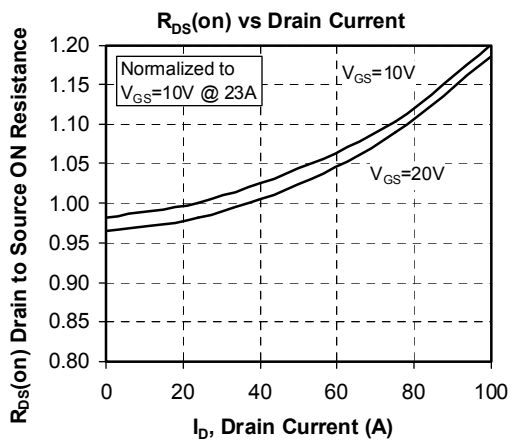
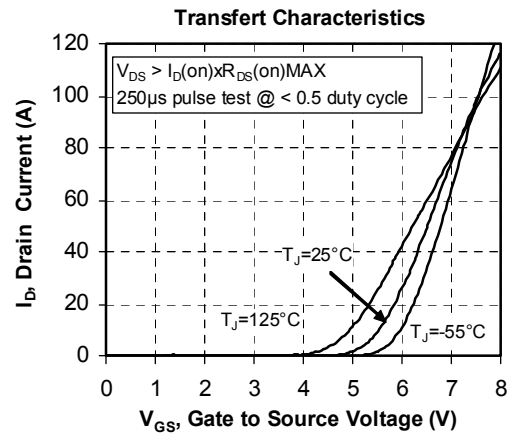
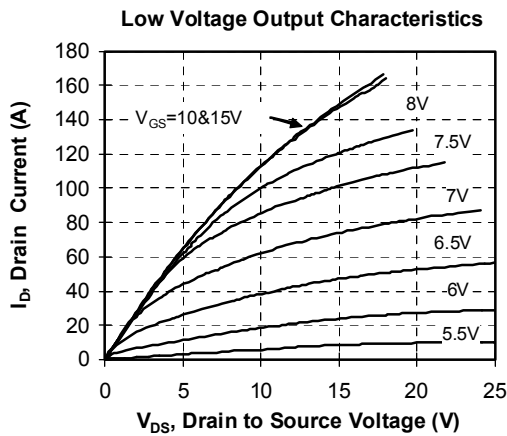
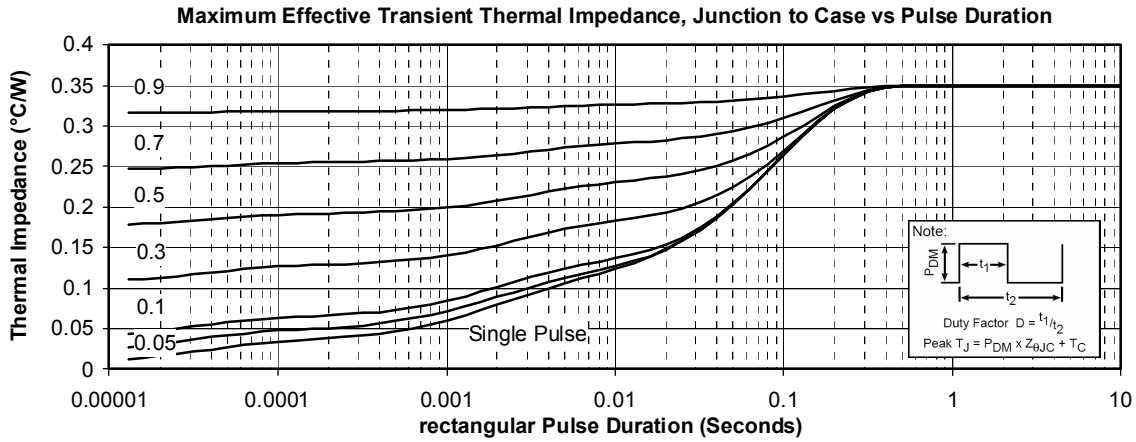
SP4 Package outline (dimensions in mm)

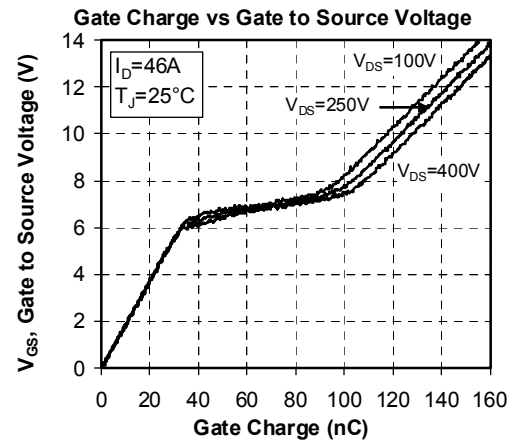
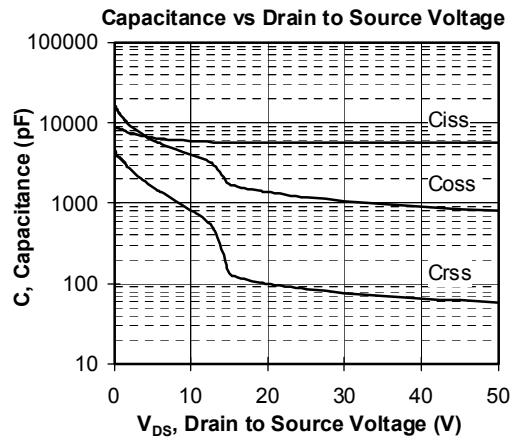
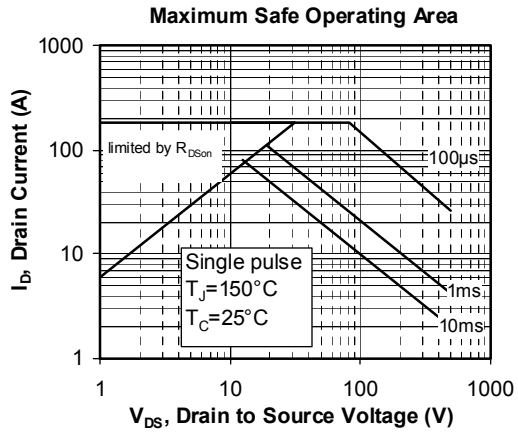
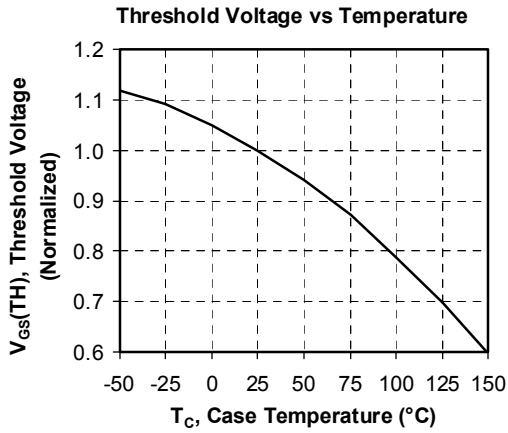
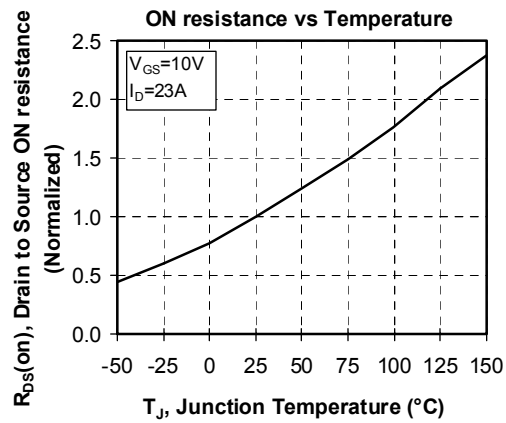
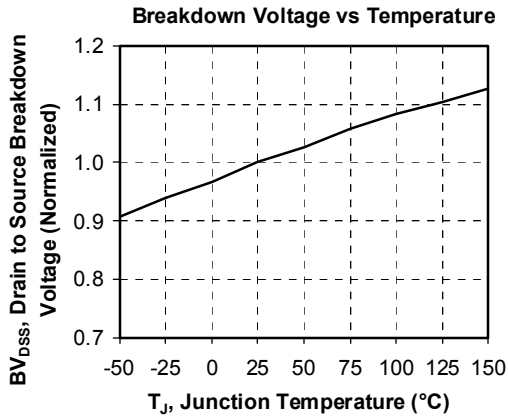


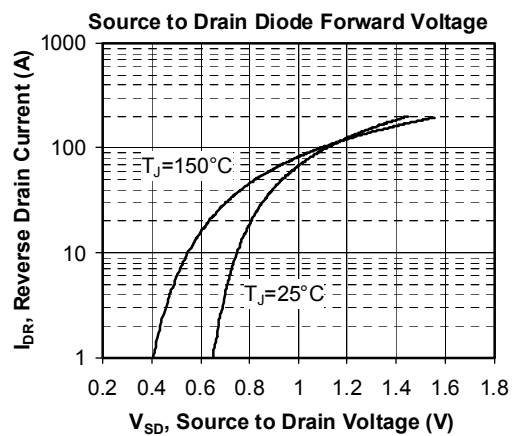
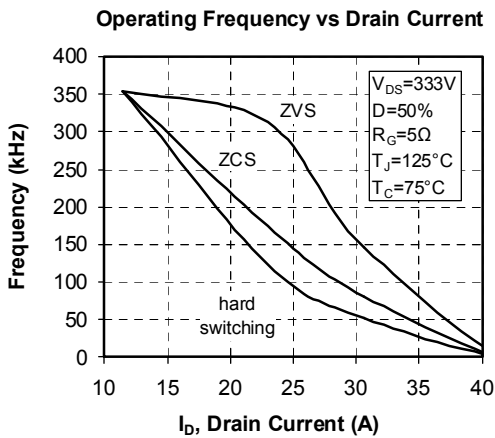
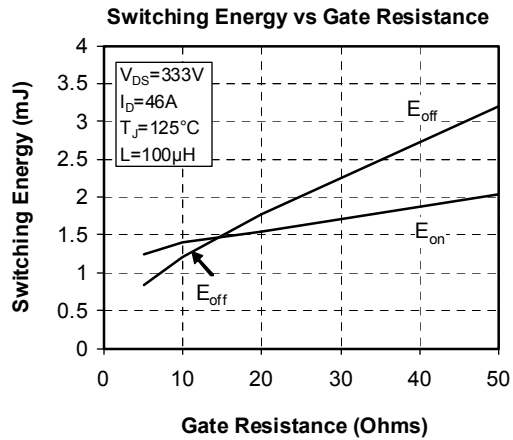
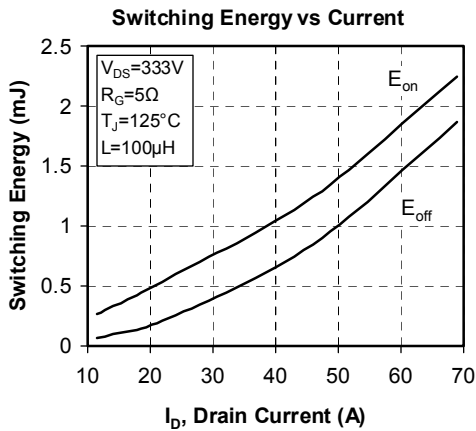
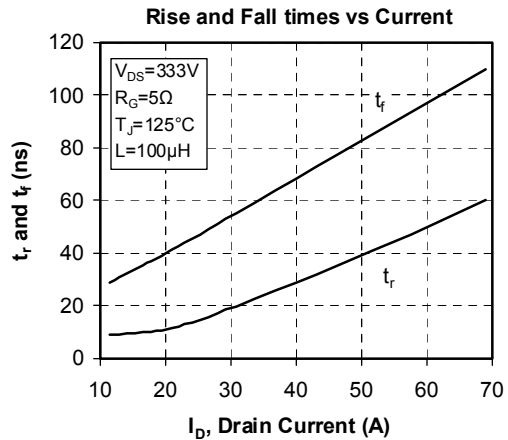
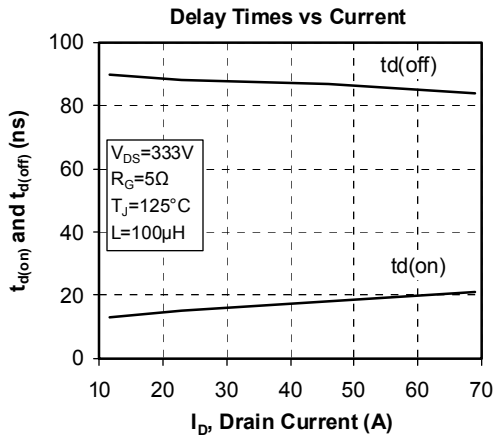
ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: $\pm\phi 1$

See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical Performance Curve







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