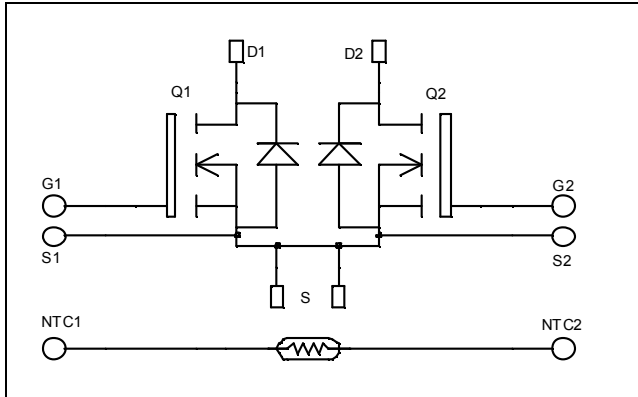


## Dual common source MOSFET Power Module

$V_{DSS} = 100V$   
 $R_{DSon} = 4.5m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 278A \text{ @ } T_c = 25^\circ C$

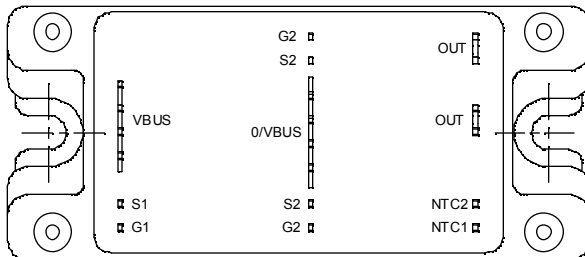


### Application

- AC Switches
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

### Features

- Power MOS V<sup>®</sup> 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	100	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	278
		$T_c = 80^\circ C$	207
$I_{DM}$	Pulsed Drain current	1100	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	5	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	780
$I_{AR}$	Avalanche current (repetitive and non repetitive)	100	A
$E_{AR}$	Repetitive Avalanche Energy	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy	3000	


**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

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

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 100V$			200	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 80V$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 125A$		4.5	5	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5\text{mA}$	2		4	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 200$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		20		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		8		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		2.9		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 50V$ $I_D = 250A$		700		nC
$Q_{gs}$	Gate – Source Charge			120		
$Q_{gd}$	Gate – Drain Charge			360		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V$ $V_{Bus} = 66V$ $I_D = 250A$ $R_G = 2.5\Omega$		80		ns
$T_r$	Rise Time			165		
$T_{d(off)}$	Turn-off Delay Time			280		
$T_f$	Fall Time			135		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 66V$ $I_D = 250A, R_G = 2.5\Omega$		1.1		mJ
$E_{off}$	Turn-off Switching Energy			1.2		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 66V$ $I_D = 250A, R_G = 2.5\Omega$		1.22		mJ
$E_{off}$	Turn-off Switching Energy			1.28		

**Source - Drain diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$I_S$	Continuous Source current (Body diode)		$T_c = 25^\circ\text{C}$			278	A
			$T_c = 80^\circ\text{C}$			207	
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -250A$			1.3	V	
$dv/dt$	Peak Diode Recovery ①				5	V/ns	
$t_{rr}$	Reverse Recovery Time	$I_S = -250A$ $V_R = 66V$	$T_j = 25^\circ\text{C}$		270	ns	
$Q_{rr}$	Reverse Recovery Charge	$di_S/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		5.8	$\mu\text{C}$	

 ①  $dv/dt$  numbers reflect the limitations of the circuit rather than the device itself.

$$I_S \leq -278A \quad di/dt \leq 200A/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

**Thermal and package characteristics**

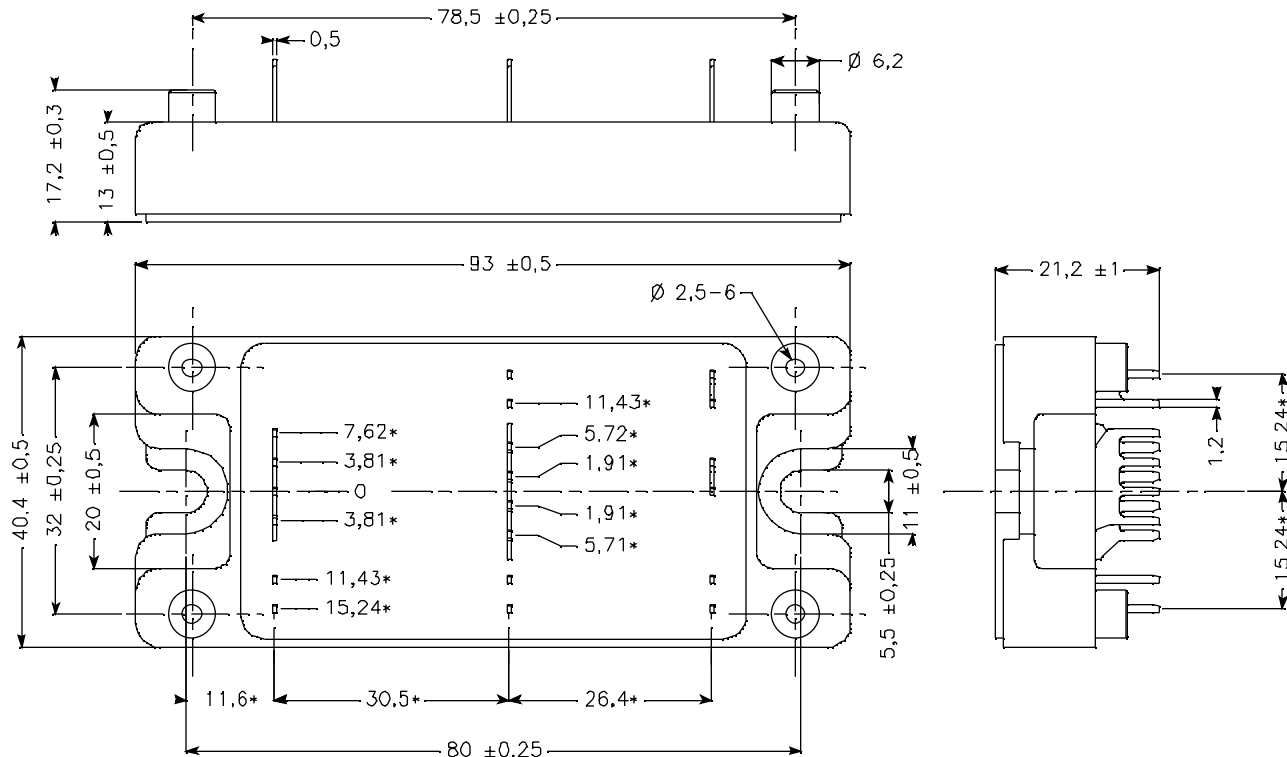
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance			0.16	°C/W	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t =1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	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 <sub>25</sub>	Resistance @ 25°C		50		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K

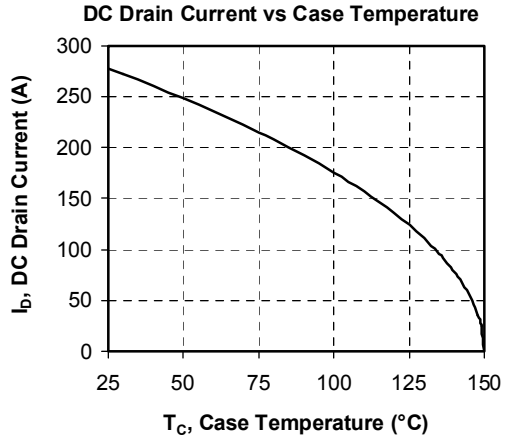
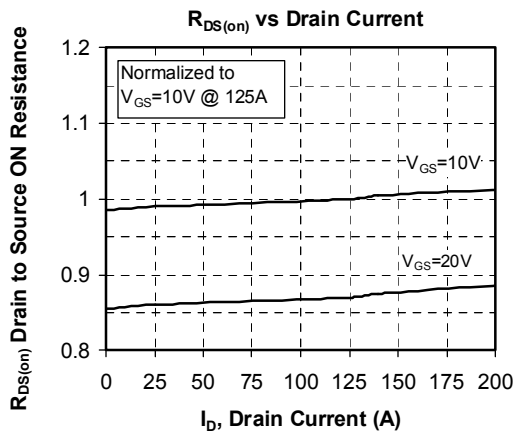
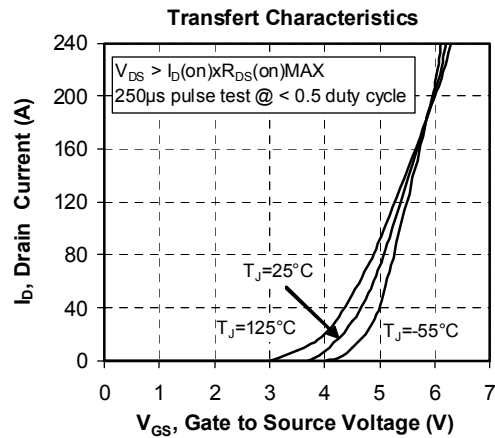
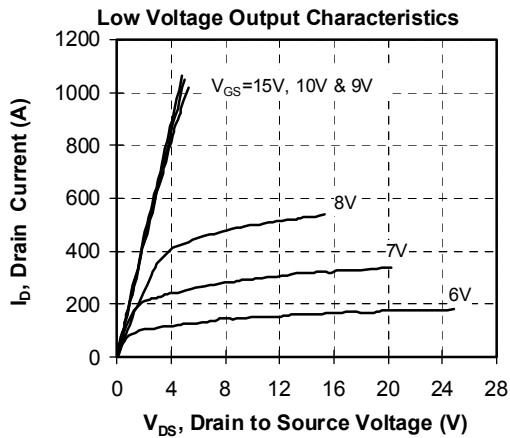
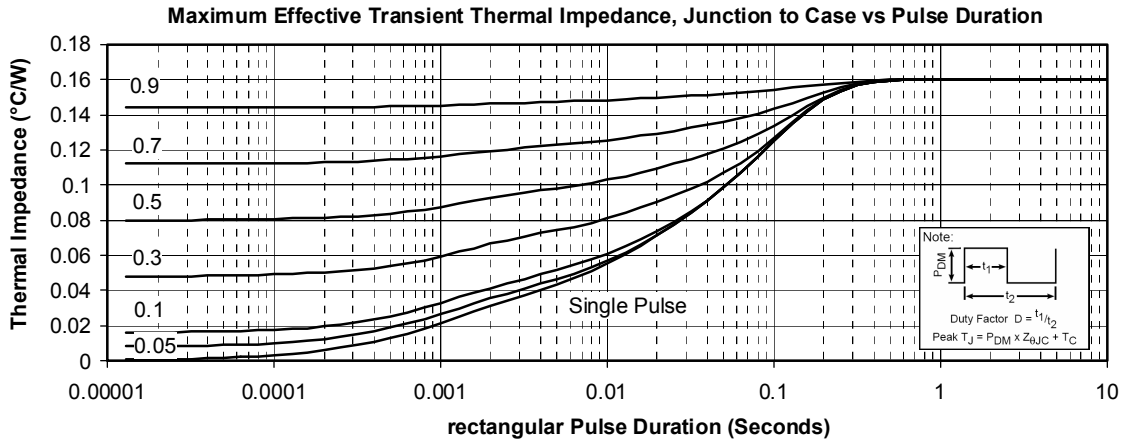
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T} - \frac{1}{T_{25}} \right) \right]}$$

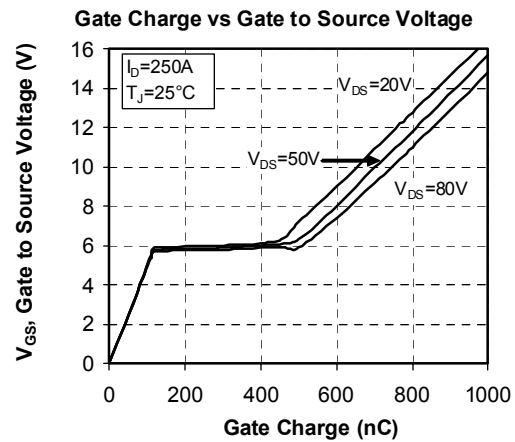
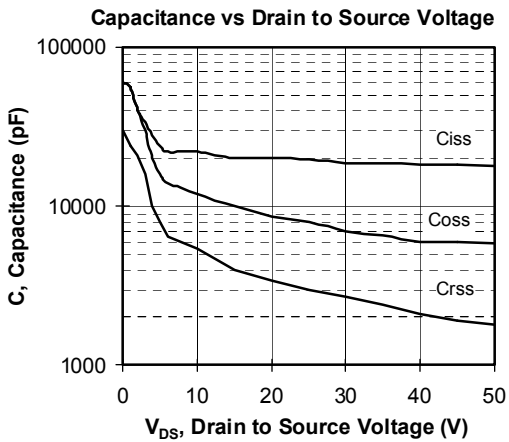
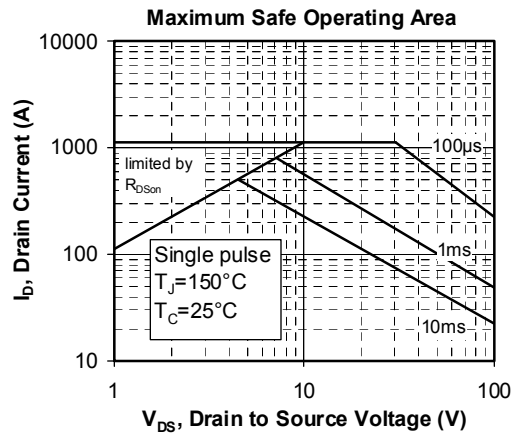
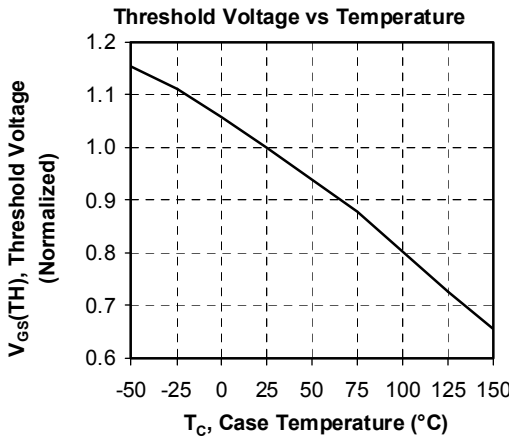
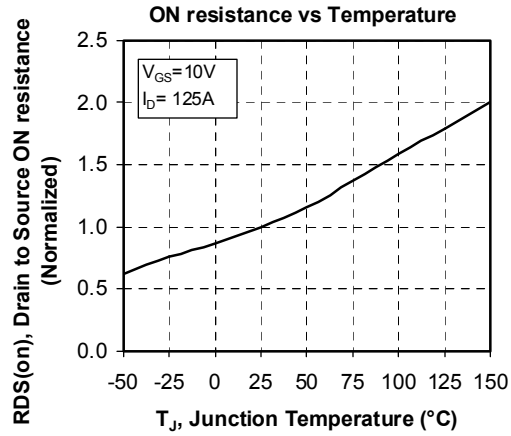
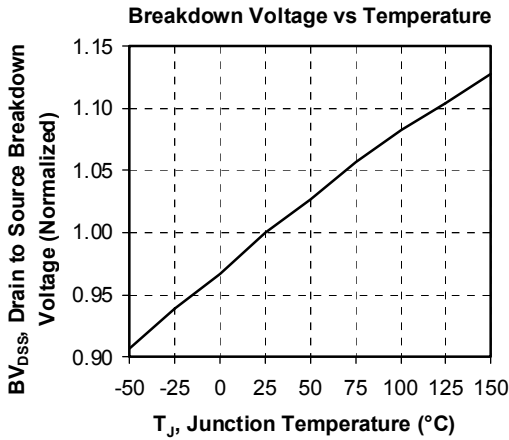
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

**SP4 Package outline** (dimensions in mm)

 ALL DIMENSIONS MARKED "\*" ARE TOLERENCED AS:  $\pm 0.1$ 

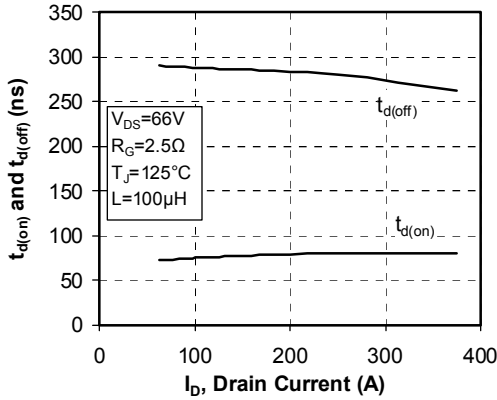
See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

## Typical Performance Curve

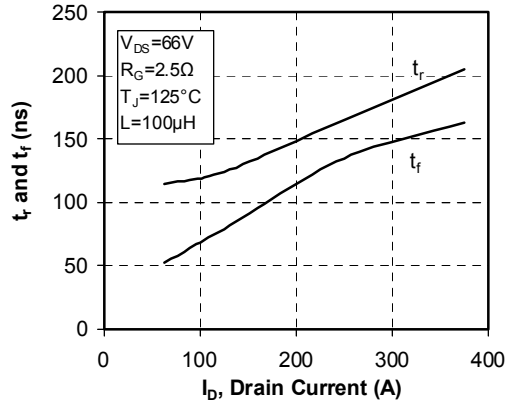




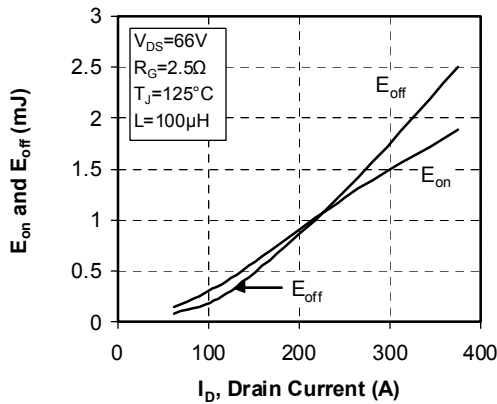
**Delay Times vs Current**



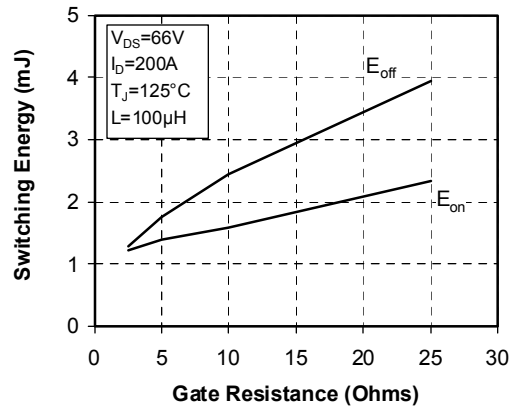
**Rise and Fall times vs Current**



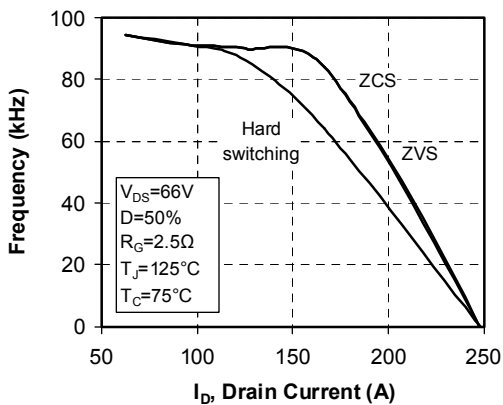
**Switching Energy vs Current**



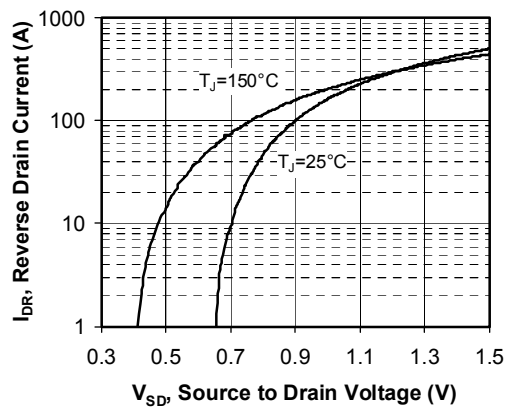
**Switching Energy vs Gate Resistance**



**Operating Frequency vs Drain Current**



**Source to Drain Diode Forward Voltage**



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