

MT40025S

N-Channel Power MOSFET
40 V, 150 A, 2.3 mΩ

Features

- Typ $R_{DS(on)} = 2.3\text{m}\Omega$ at $V_{GS} = 10\text{V}, I_D = 40\text{A}$
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handling capability

General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

Applications

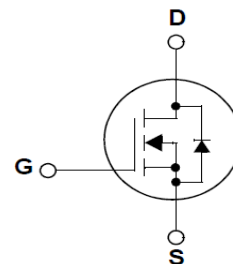
- DC-DC primary bridge
- DC-DC Synchronous rectification
- Power Management for Inverter Systems



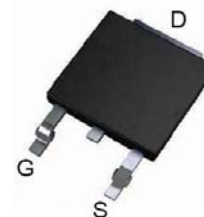
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Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



TO-252-2L

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Common Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	40	V
V_{GSS}	Gate-Source Voltage	± 20	
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
I_S	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$ 100	A

Mounted on Large Heat Sink

I_{DM}	Pulsed Drain Current *	300	A	
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	150	A
		$T_C = 100^\circ\text{C}$	90	
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	50	W
		$T_C = 100^\circ\text{C}$	35	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.3	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	32.5		

Avalanche Ratings

E_{AS}	Avalanche Energy, Single Pulsed	$L = 0.3\text{mH}$	220***	mJ
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Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	10	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	1.5	3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)*}	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =40A	-	2.3	2.6	mΩ
Diode Characteristics						
V _{SD*}	Diode Forward Voltage	I _{SD} =40A, V _{GS} =0V	-	0.8	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =40A, dI _{SD} /dt=100A/μs	-	33	-	ns
Q _{rr}	Reverse Recovery Charge		-	61	-	nC

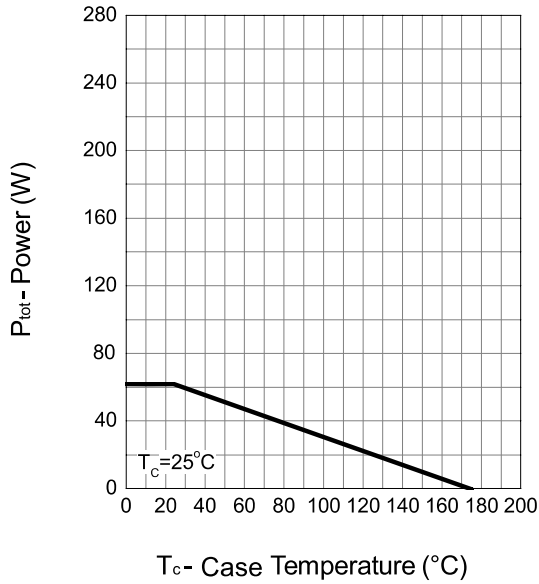
Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.8	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	3203	-	pF
C_{oss}	Output Capacitance		-	362	-	
C_{rss}	Reverse Transfer Capacitance		-	277	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=24V, R_G=3\ \Omega,$ $I_{DS}=40A, V_{GS}=10V,$	-	15	-	ns
T_r	Turn-on Rise Time		-	13	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	20	-	
T_f	Turn-off Fall Time		-	8	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V,$ $I_{DS}=40A$	-	84	-	nC
Q_{gs}	Gate-Source Charge		-	14	-	
Q_{gd}	Gate-Drain Charge		-	30	-	

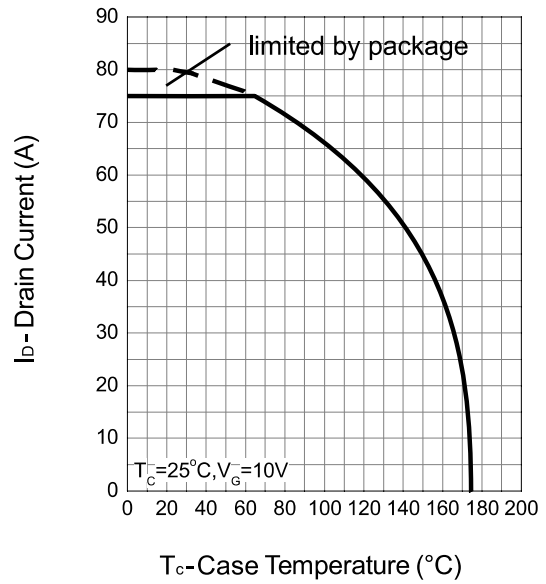
Note * : Pulse test ; pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

Typical Operating Characteristics

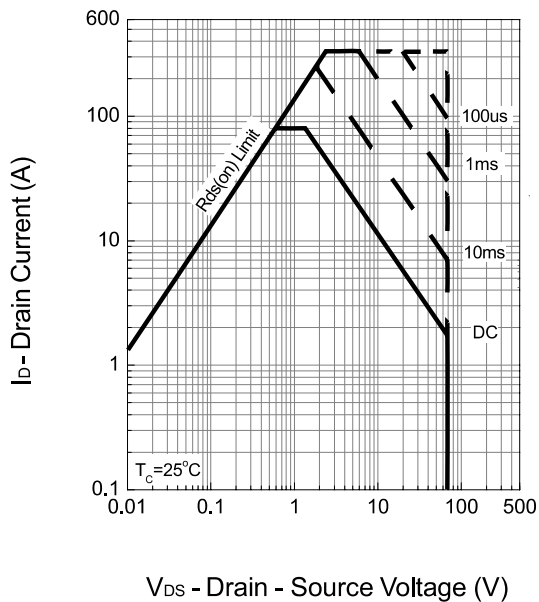
Power Dissipation



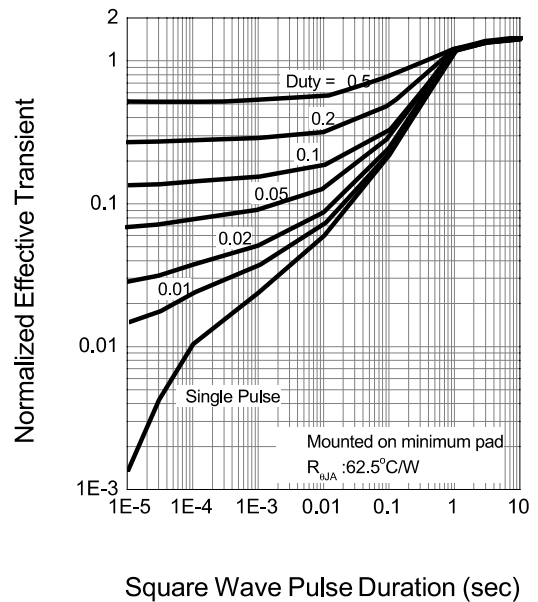
Drain Current



Safe Operation Area

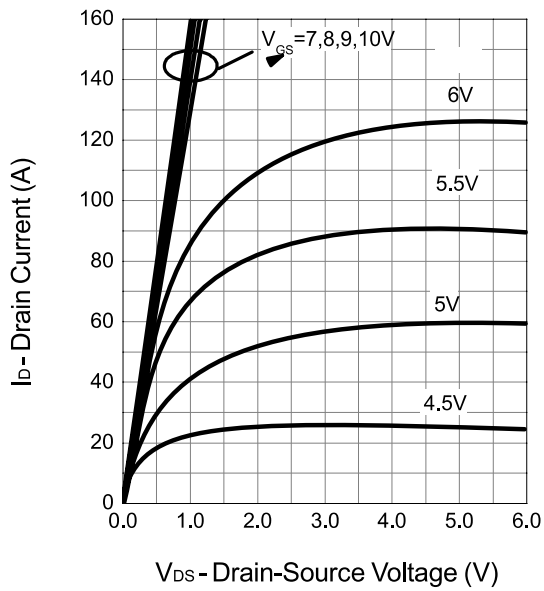


Thermal Transient Impedance

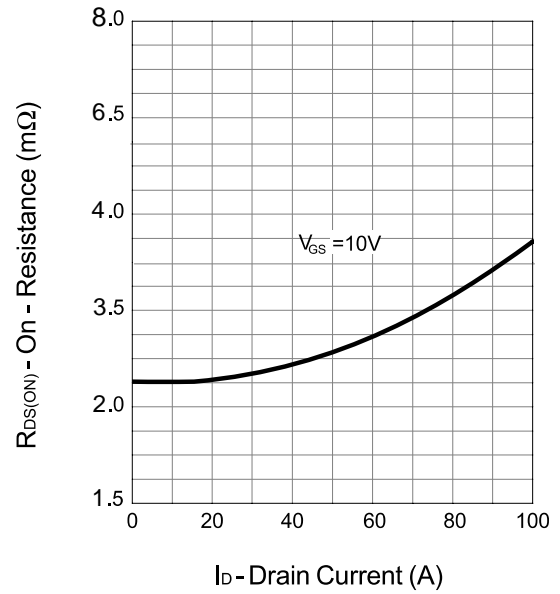


Typical Operating Characteristics (Cont.)

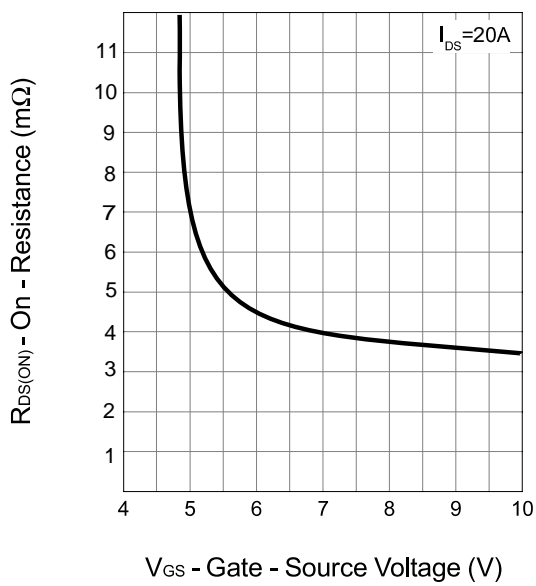
Output Characteristics



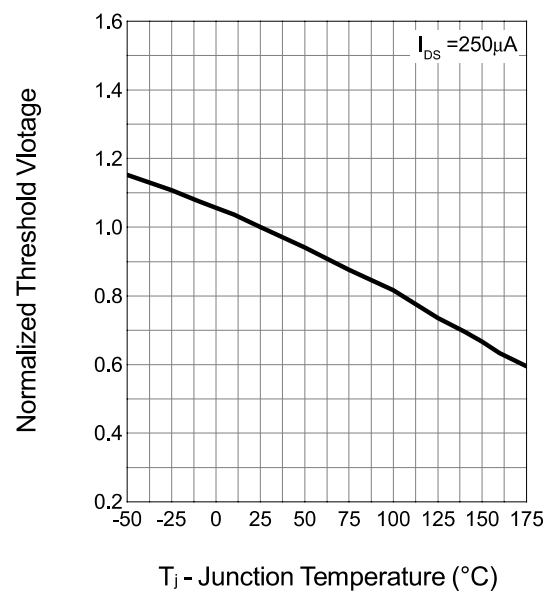
Drain-Source On Resistance



Drain-Source On Resistance

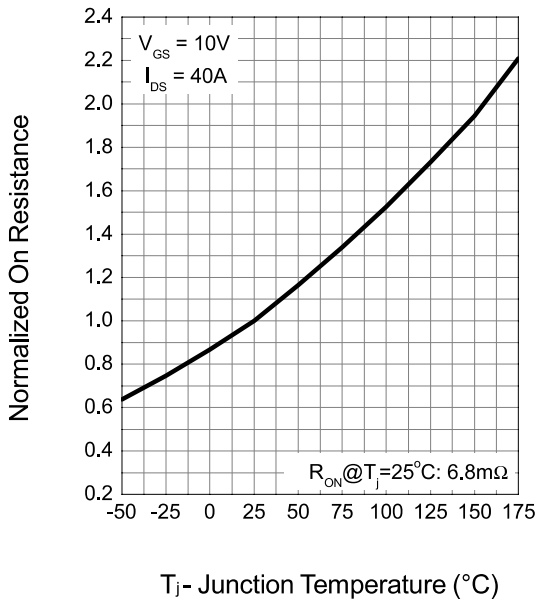


Gate Threshold Voltage

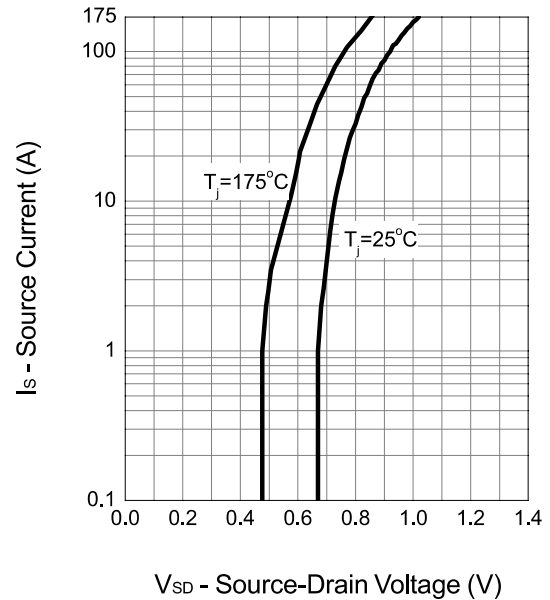


Typical Operating Characteristics (Cont.)

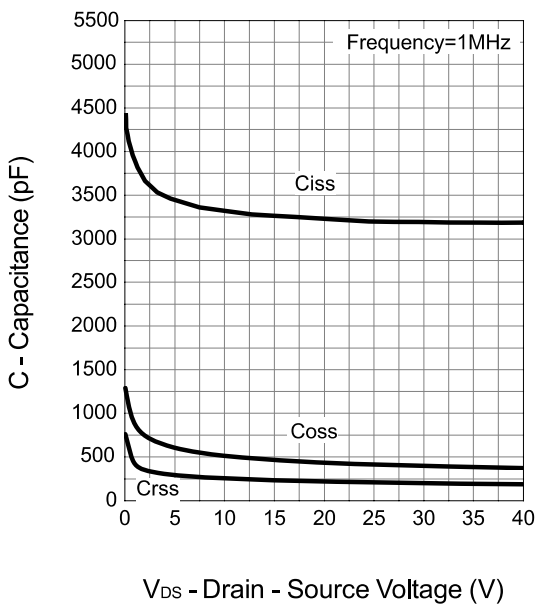
Drain-Source On Resistance



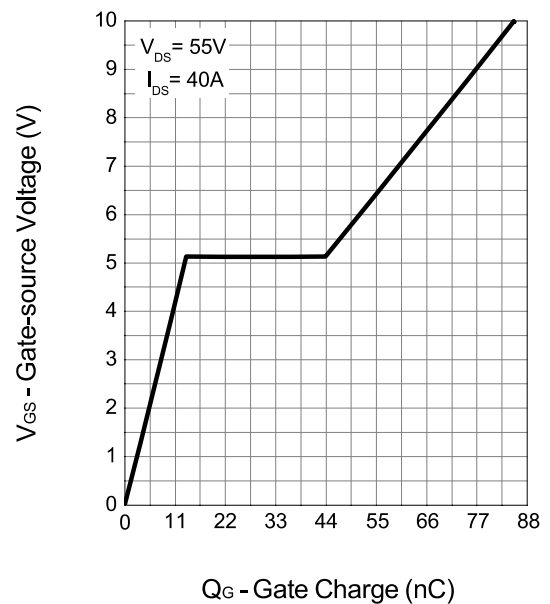
Source-Drain Diode Forward



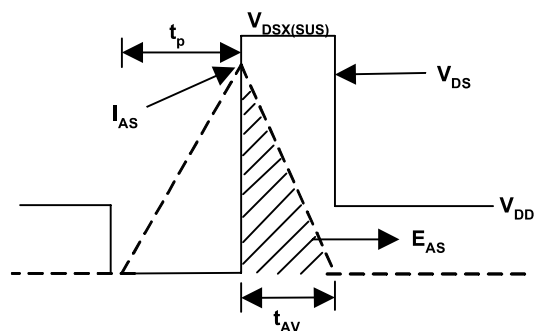
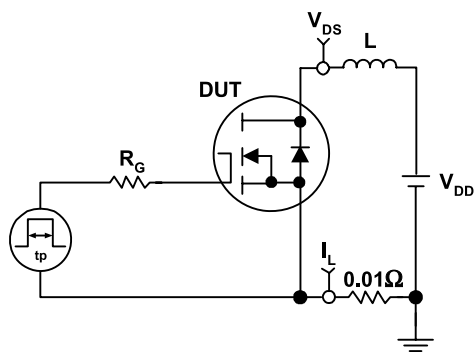
Capacitance



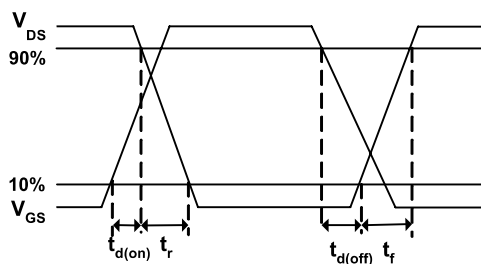
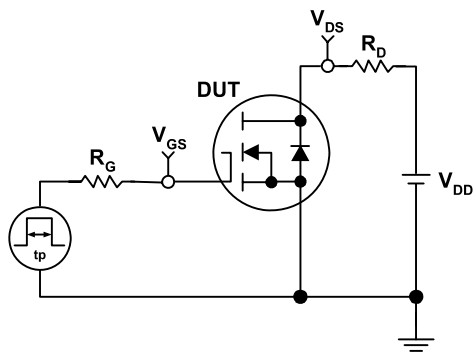
Gate Charge



Avalanche Test Circuit and Waveforms

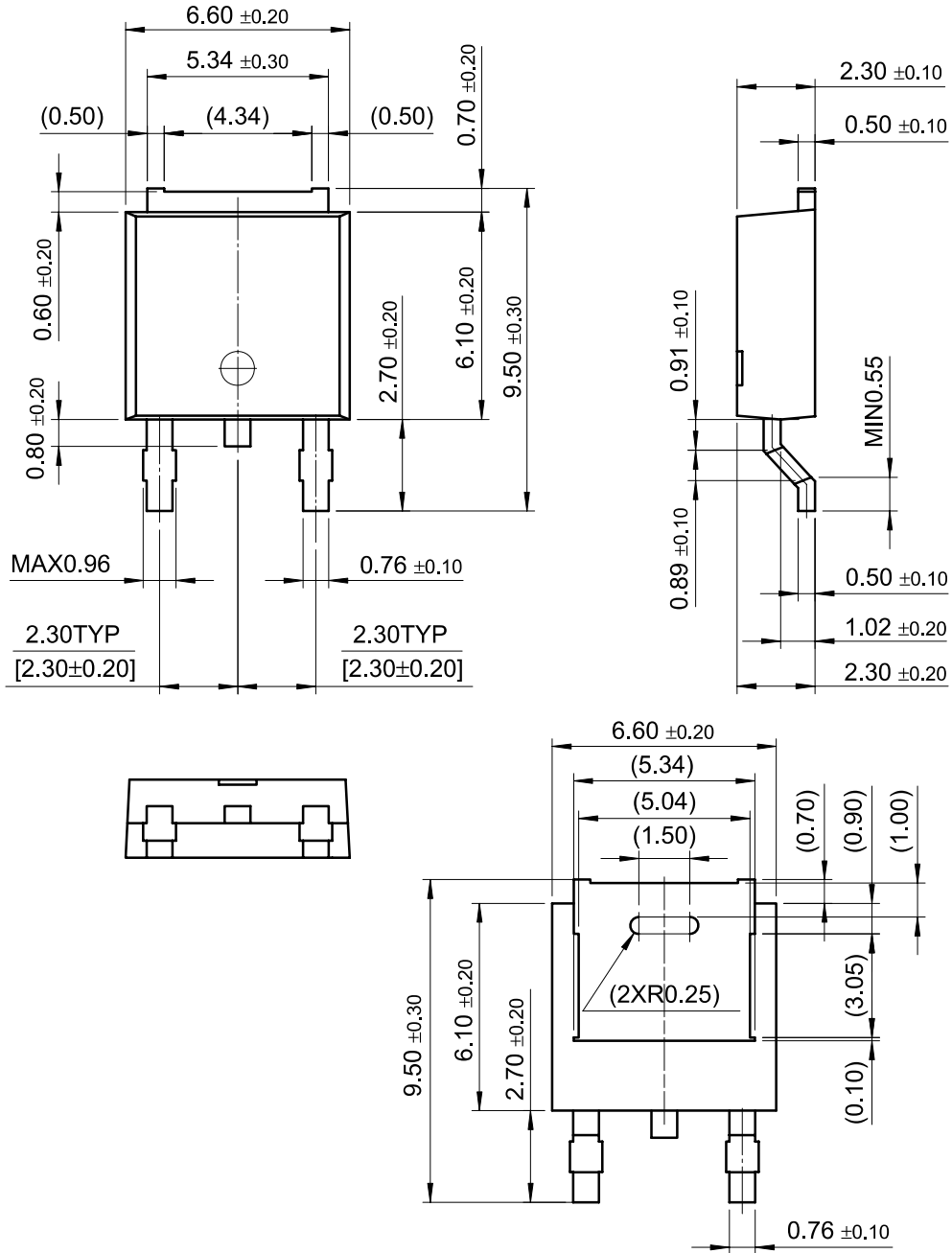


Avalanche Test Circuit and Waveforms



Package Dimensions

TO-252-2L



Dimensions in Millimeters

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