

N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^e	Q _g (Typ.)
20	0.015 at V _{GS} = 4.5 V	6.5 ^a	8.6nC
	0.020 at V _{GS} = 2.5 V	4.8 ^a	
	0.024 at V _{GS} = 1.8 V	3.9	

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC

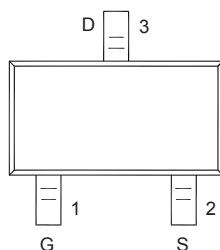
APPLICATIONS

- DC/DC Converters
- Load Switch for Portable Applications



RoHS
COMPLIANT

(SOT-23-3L)



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	20	V
Gate-Source Voltage	V _{GS}	± 12	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	A
		T _C = 70 °C	
		T _A = 25 °C	
		T _A = 70 °C	
Pulsed Drain Current	I _{DM}	24	A
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	
		T _A = 25 °C	W
Maximum Power Dissipation	P _D	T _C = 25 °C	
		T _C = 70 °C	
		T _A = 25 °C	
		T _A = 70 °C	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	70	100	°C/W
Maximum Junction-to-Foot (Drain)	R _{thJF}	30	60	

Notes:

- Package limited
- Surface Mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 125 °C/W.
- Based on T_C = 25 °C.

SPECIFICATIONS T _J = 25 °C, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		25		mV/°C	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 2.6			
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.45		1.0	V	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 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 = 70 °C			10		
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 = 5.0 A		0.015	0.019	Ω	
		V _{GS} = 2.5 V, I _D = 5 A		0.020	0.024		
		V _{GS} = 1.8 V, I _D = 4.5 A		0.024	0.030		
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 5.0 A		25		S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		860		pF	
Output Capacitance	C _{oss}			95			
Reverse Transfer Capacitance	C _{rss}			59			
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 5 V, I _D = 5.0 A		11	19	nC	
Gate-Source Charge	Q _{gs}	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 5.0 A		8.9	15		
Gate-Drain Charge	Q _{gd}			1.1			
Gate Resistance	R _g			0.7			
Turn-On Delay Time	t _{d(on)}	f = 1 MHz	0.5	2.3	4.9	Ω	
Rise Time	t _r		V _{DD} = 10 V, R _L = 2.2 Ω I _D ≅ 4 A, V _{GEN} = 4.5 V, R _g = 1 Ω		8	17	ns
Turn-Off Delay Time	t _{d(off)}				19	25	
Fall Time	t _f				30	45	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 2.2 Ω I _D ≅ 4 A, V _{GEN} = 5 V, R _g = 1 Ω			9	19	
Rise Time	t _r			6	10		
Turn-Off Delay Time	t _{d(off)}			14	20		
Fall Time	t _f			20	32		
				7	12		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			6.5	A	
Pulse Diode Forward Current	I _{SM}				24		
Body Diode Voltage	V _{SD}	I _S = 4 A, V _{GS} = 0 V		0.8	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = 4 A, dI/dt = 100 A/μs, T _J = 25 °C		13	21	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			6	10	nC	
Reverse Recovery Fall Time	t _a			8		ns	
Reverse Recovery Rise Time	t _b			5			

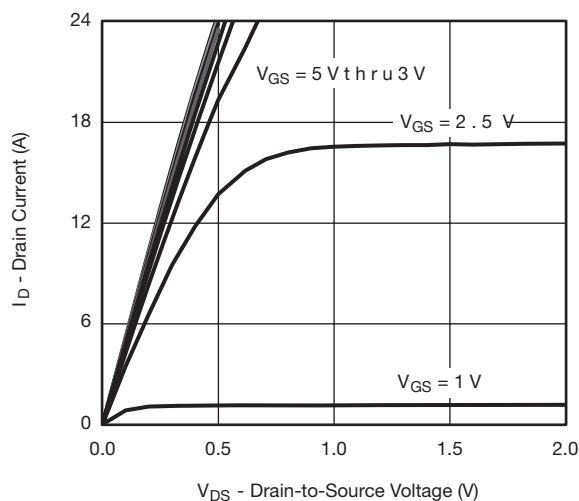
Notes:

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

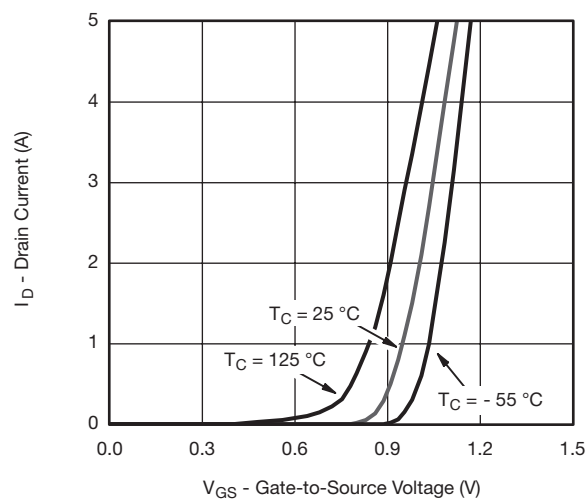
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

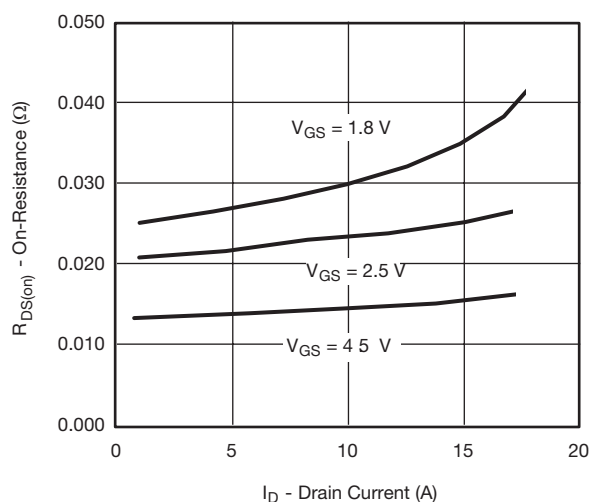
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



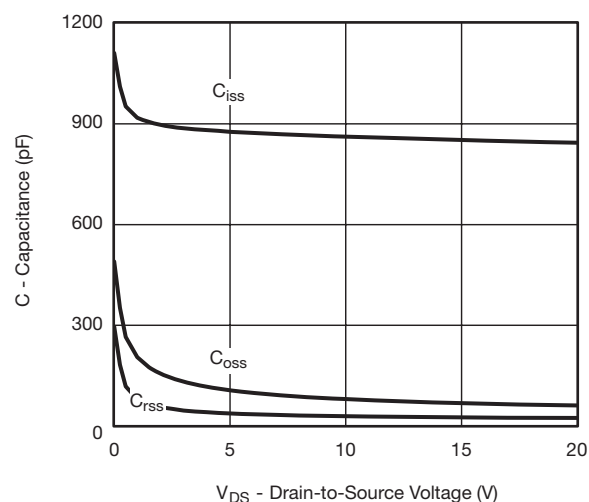
Output Characteristics



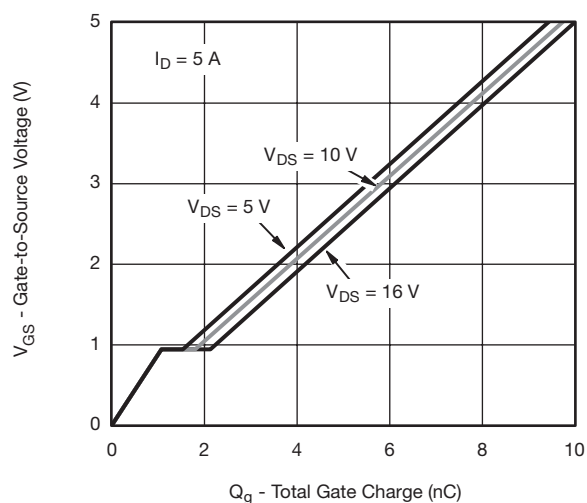
Transfer Characteristics



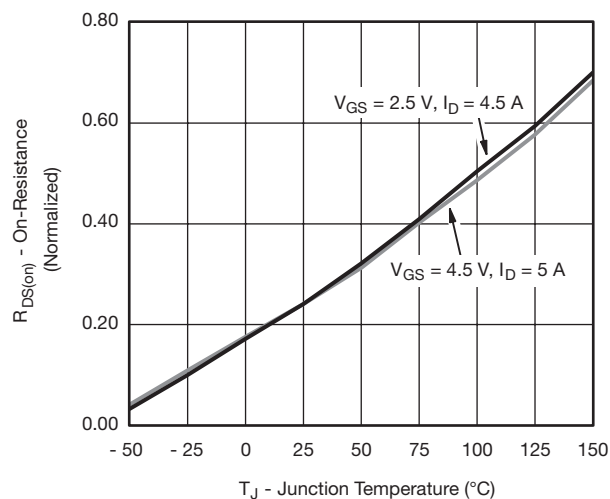
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

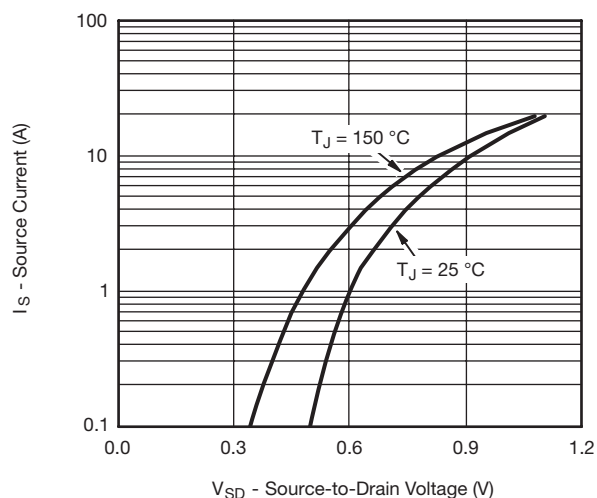


Gate Charge

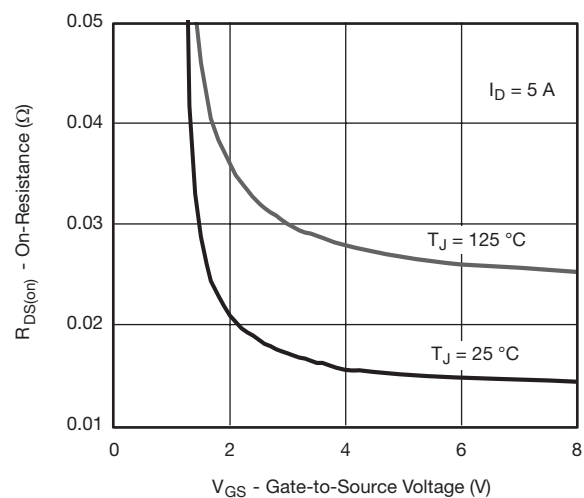


On-Resistance vs. Junction Temperature

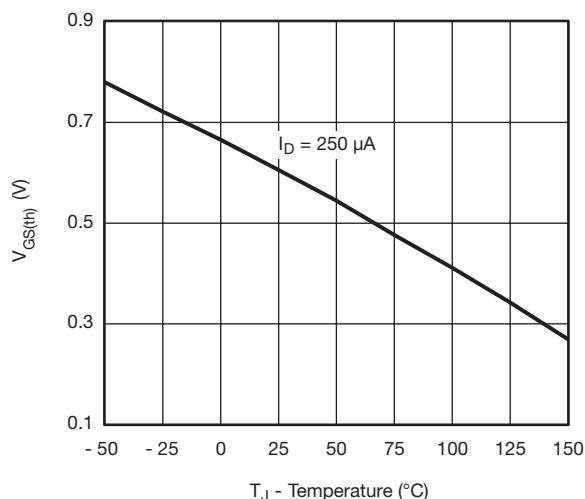
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



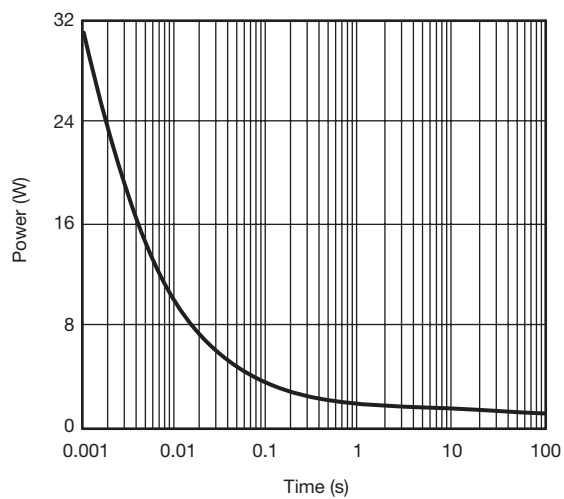
Source-Drain Diode Forward Voltage



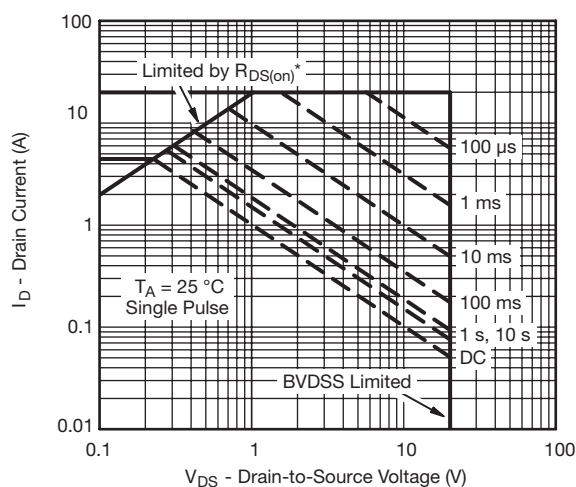
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

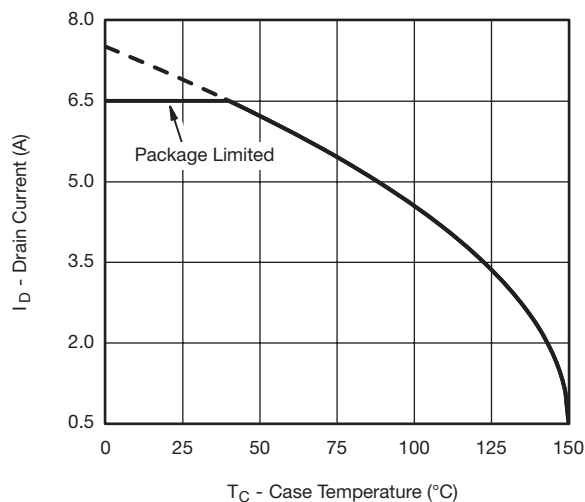


Single Pulse Power (Junction-to-Ambient)

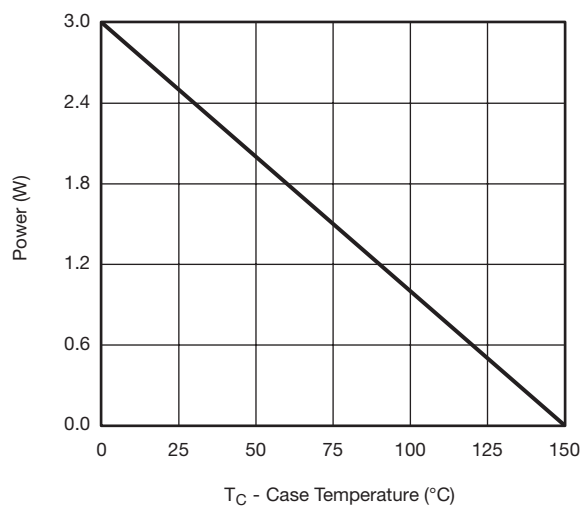


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient

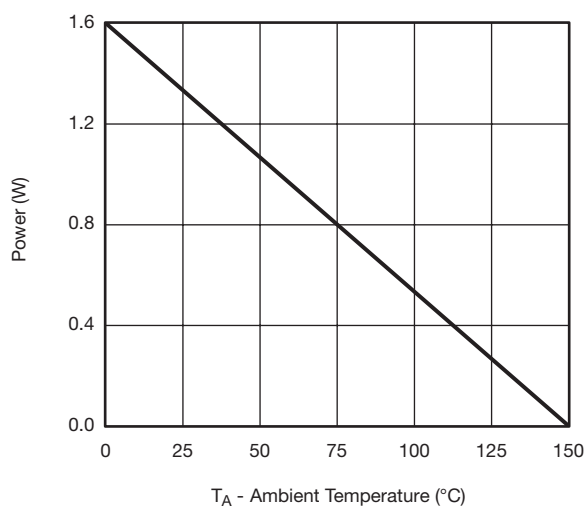
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



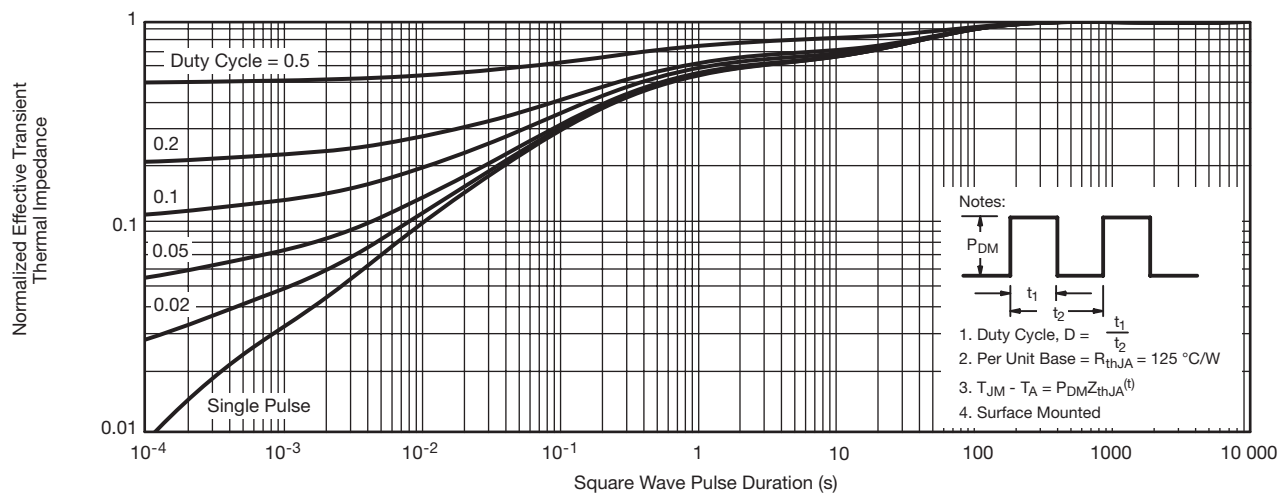
Power Derating, Junction-to-Foot



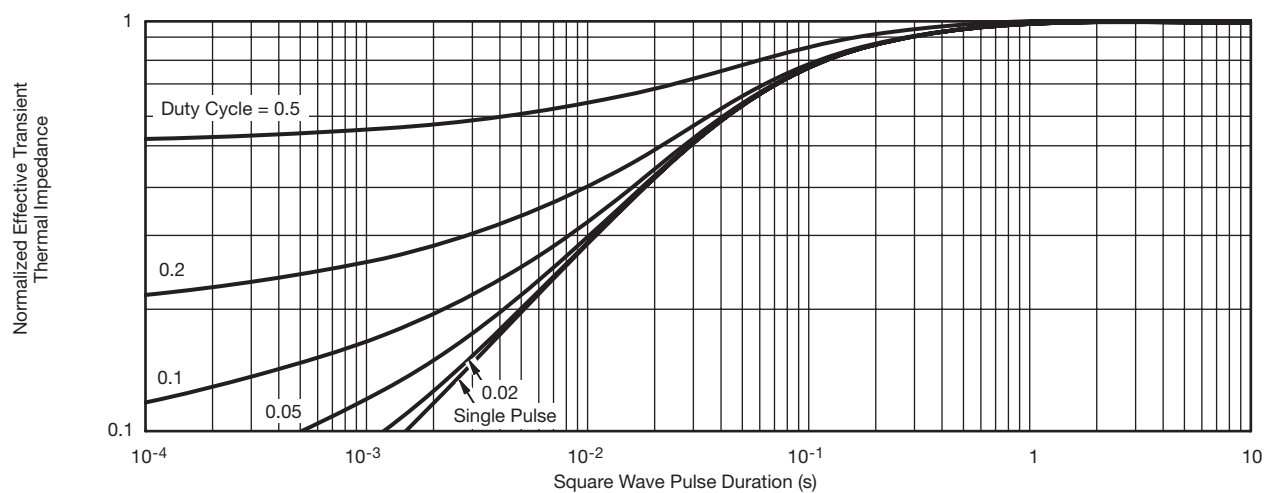
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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