

N-Channel 150 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
150	0.073 at $V_{GS} = 10$ V	23
	0.077 at $V_{GS} = 6$ V	22.5

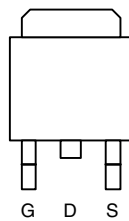
FEATURES

- TrenchFET® Power MOSFETS
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- PWM Optimized
- Compliant to RoHS Directive 2002/95/EC

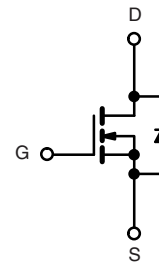

RoHS
COMPLIANT

APPLICATIONS

- Primary Side Switch

TO-263


Top View



N-Channel MOSFET

Ordering Information: SUM23N15-73-E3 (Lead (Pb) free)

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	23
		$T_C = 125$ °C	13.4
Pulsed Drain Current	I_{DM}	35	A
Avalanche Current	I_{AR}	25	
Repetitive Avalanche Energy ^a	E_{AR}	31	mJ
Maximum Power Dissipation ^a	P_D	$T_C = 25$ °C	100 ^b
		$T_A = 25$ °C ^c	3.75
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	1.5	

Notes:

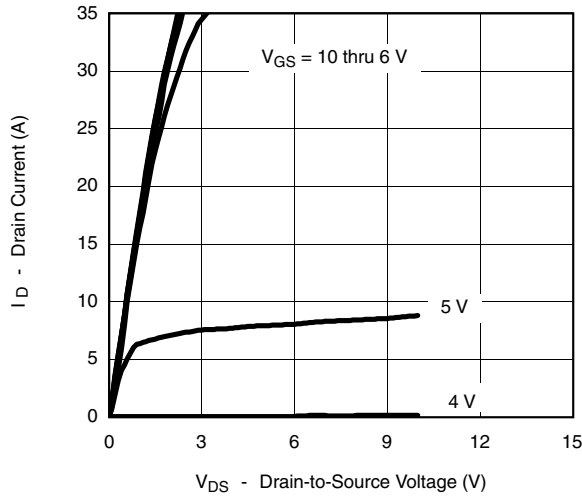
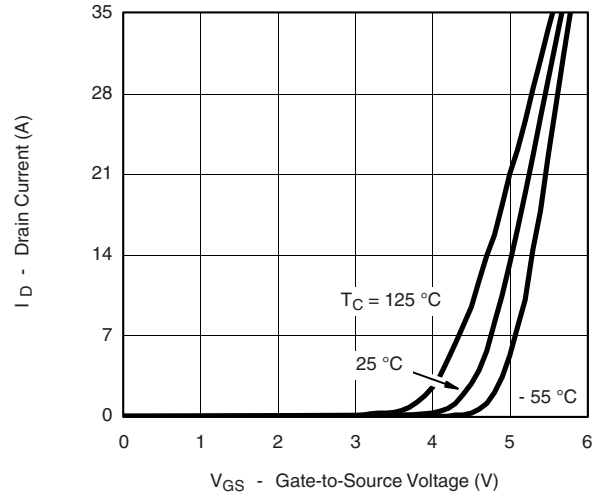
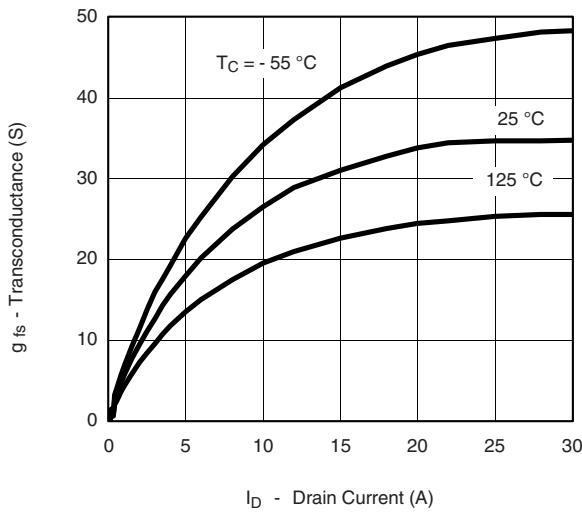
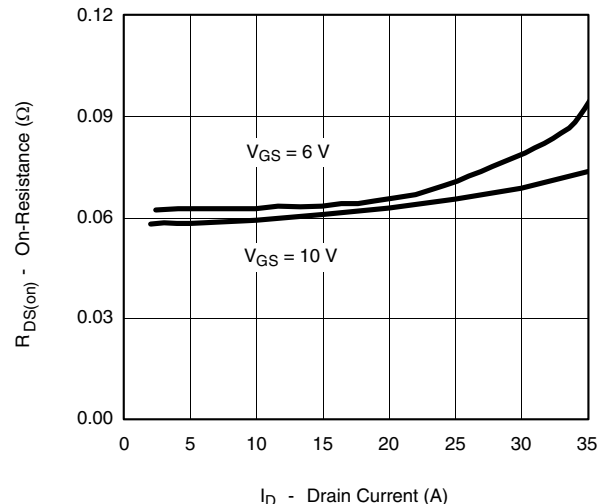
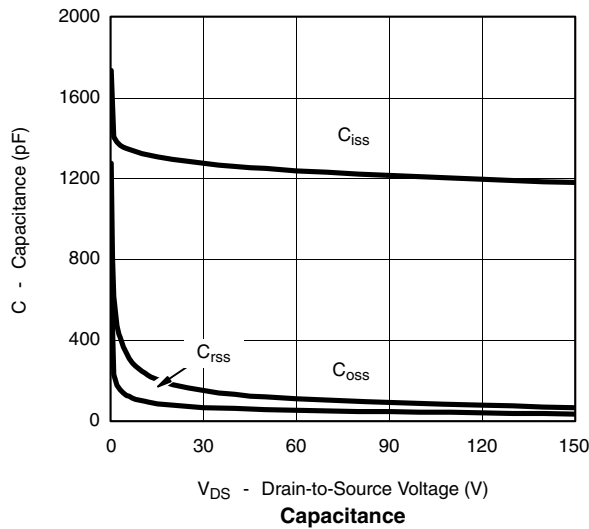
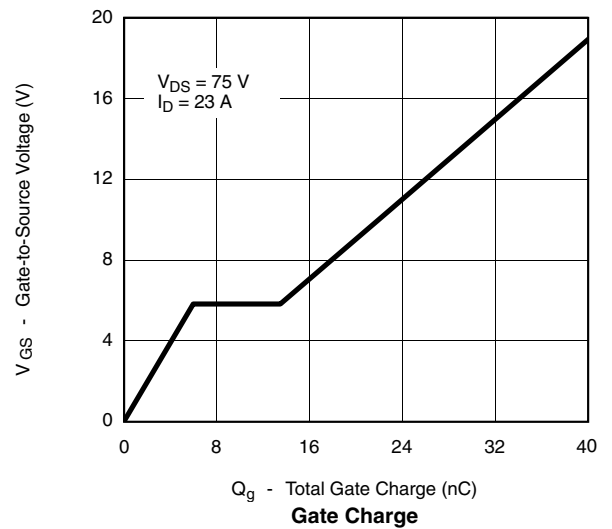
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	150			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	35			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		0.059	0.073	Ω
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.140	
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.168	
		$V_{GS} = 6\text{ V}, I_D = 10\text{ A}$		0.062	0.077	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 25\text{ A}$	10			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		1290		μF
Output Capacitance	C_{oss}			160		
Reverse Transfer Capacitance	C_{rss}			70		
Total Gate Charge ^c	Q_g	$V_{DS} = 75\text{ V}, V_{GS} = 10\text{ V}, I_D = 23\text{ A}$		22	35	nC
Gate-Source Charge ^c	Q_{gs}			6		
Gate-Drain Charge ^c	Q_{gd}			7.5		
Gate Resistance	R_G			4		Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 75\text{ V}, R_L = 3.26\text{ }\Omega$ $I_D \cong 23\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$		10	15	ns
Rise Time ^c	t_r			60	90	
Turn-Off Delay Time ^c	$t_{d(off)}$			30	43	
Fall Time ^c	t_f			45	70	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) ^b						
Continuous Current	I_S				35	A
Pulsed Current	I_{SM}				23	
Forward Voltage ^a	V_{SD}	$I_F = 23\text{ A}, V_{GS} = 0\text{ V}$		1	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 23\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		100	150	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$			5	8	A
Reverse Recovery Charge	Q_{rr}			0.25	0.6	μC

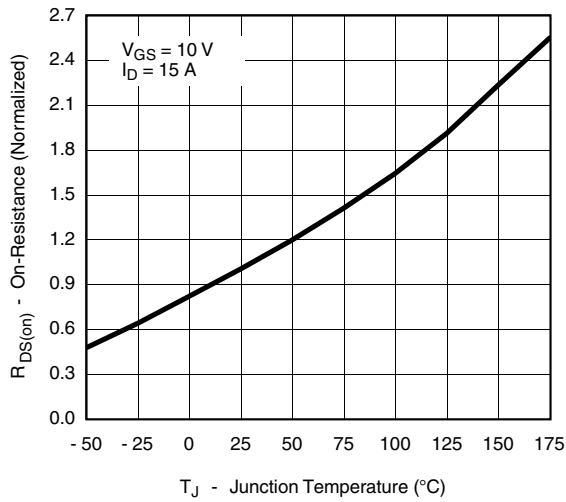
Notes:

- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

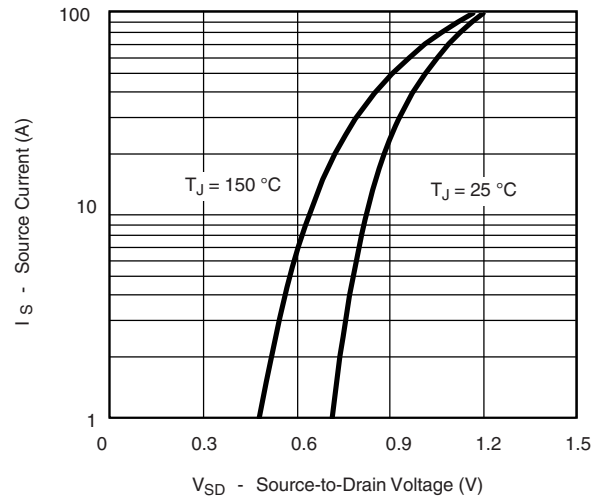
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °C unless noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

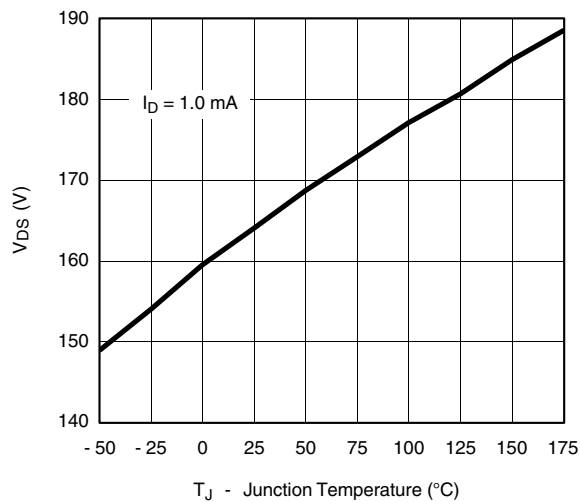
TYPICAL CHARACTERISTICS (25 °C unless noted)



On-Resistance vs. Junction Temperature

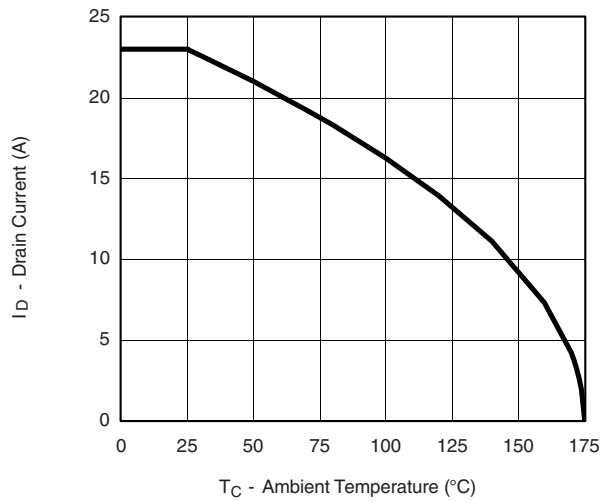


Source-Drain Diode Forward Voltage

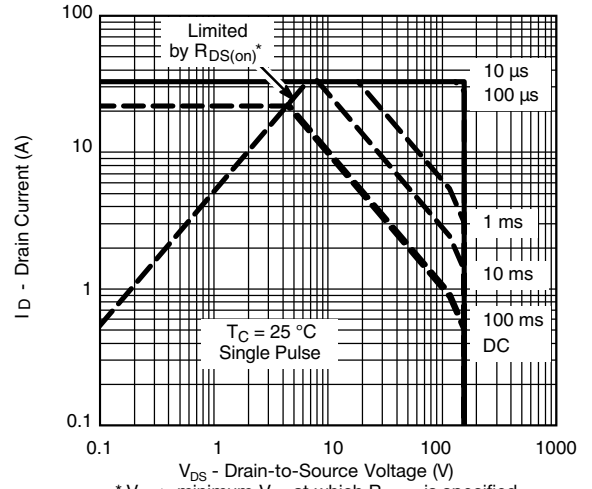


Drain Source Breakdown vs. Junction Temperature

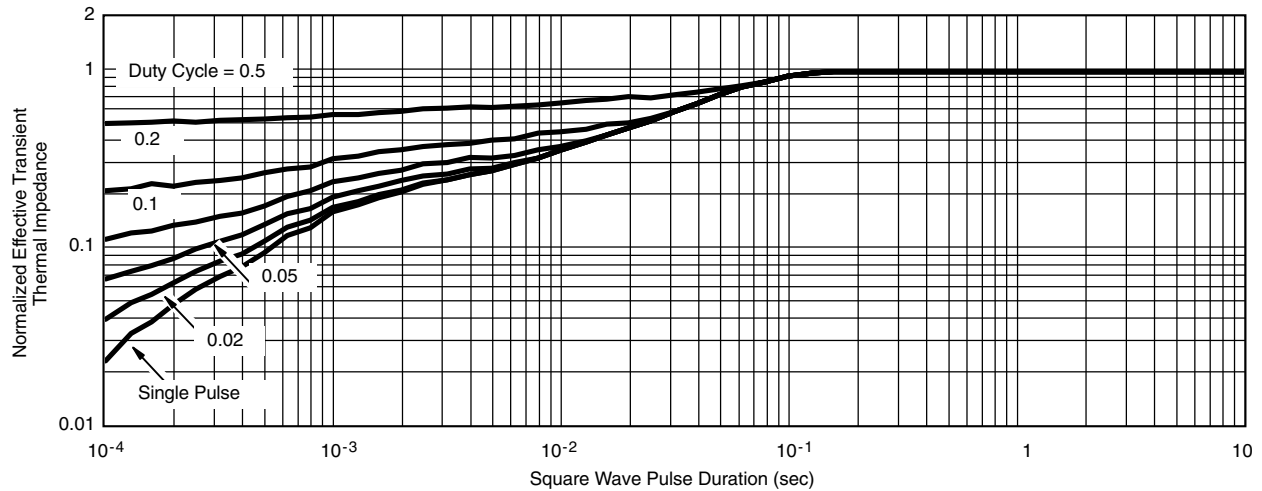
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area
* $V_{GS} > \text{minimum } V_{GS} \text{ at which } R_{DS(on)} \text{ is specified}$



Normalized Thermal Transient Impedance, Junction-to-Case

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