

P-Channel 40-V (D-S) 175 °C MOSFET

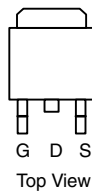
PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^d
- 40	0.0042 at $V_{GS} = - 10$ V	- 110
	0.0062 at $V_{GS} = - 4.5$ V	- 110

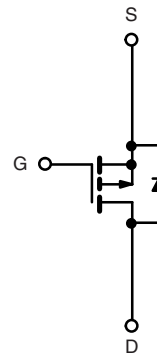
FEATURES

- TrenchFET[®] Power MOSFET
- New Package with Low Thermal Resistance


 Available
RoHS*
 COMPLIANT

TO-263


Ordering Information: SUM110P04-04L
 SUM110P04-04L (Lead (Pb)-free)



P-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 40	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C) ^d	I_D	$T_C = 25$ °C	- 110
		$T_C = 125$ °C	- 110
Pulsed Drain Current	I_{DM}	- 240	A
Avalanche Current	I_{AS}	- 75	
Single Pulse Avalanche Energy ^a	E_{AS}	281	mJ
Power Dissipation	P_D	$T_C = 25$ °C	375 ^c
		$T_A = 25$ °C ^b	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 ^b	R_{thJA}	40	°C/W
Junction-to-Case	R_{thJC}	0.4	

Notes:

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

* Pb containing terminations are not RoHS compliant, exemptions may apply.



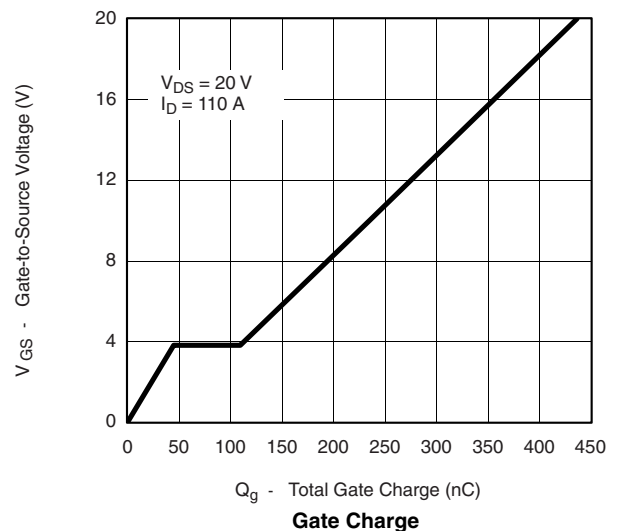
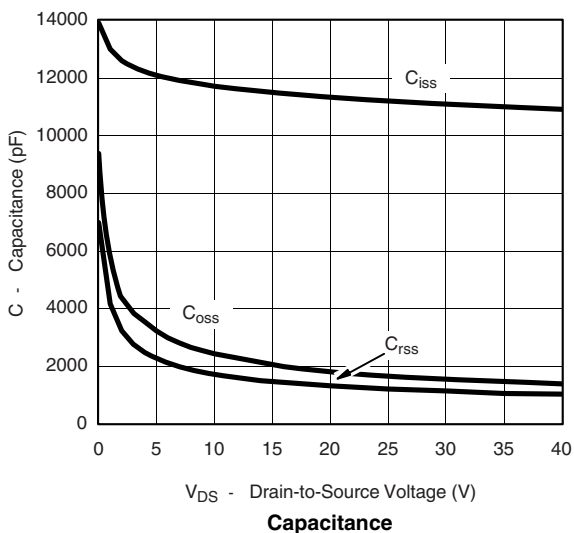
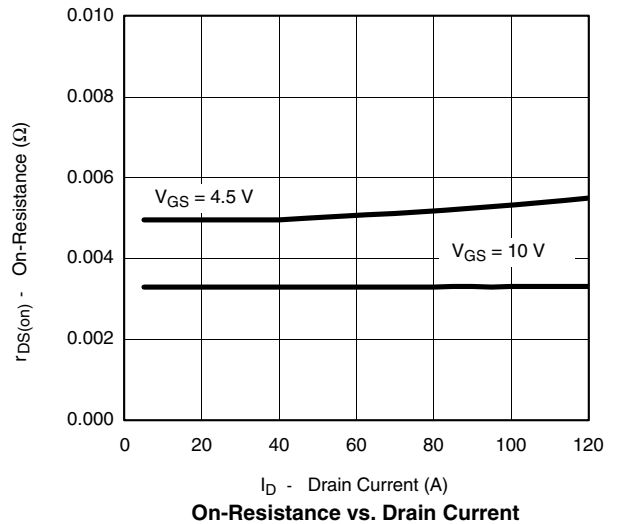
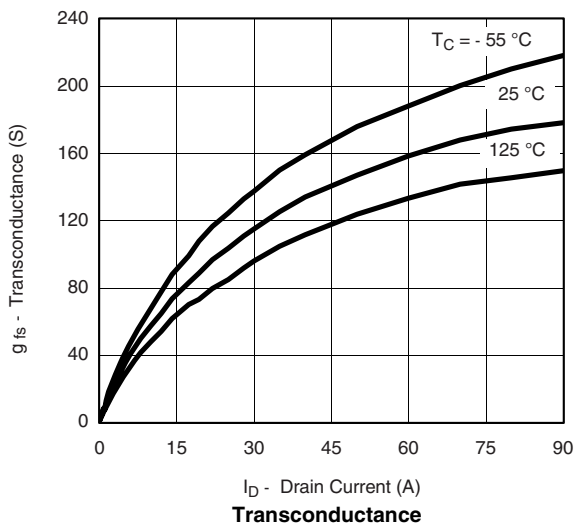
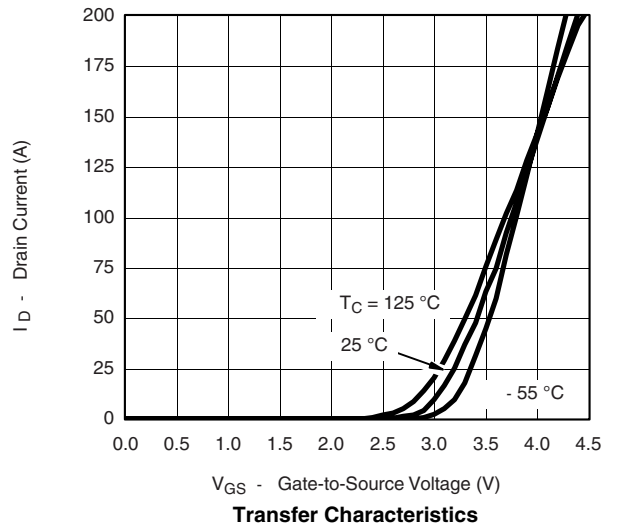
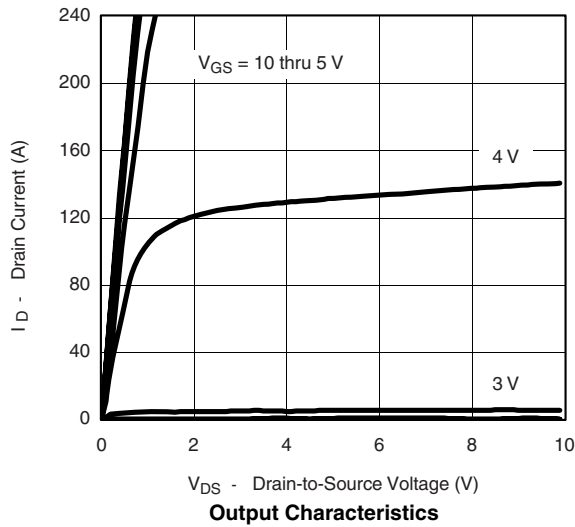
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 3	
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}	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$			- 1	
		$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			- 50	μA
		$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			- 250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 120			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		0.0034	0.0042	
		$V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.0063	Ω
		$V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.0076	
		$V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		0.005	0.0062	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -30\text{ A}$	20			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$		11200		μF
Output Capacitance	C_{oss}			1650		
Reverse Transfer Capacitance	C_{rss}			1200		
Total Gate Charge ^c	Q_g	$V_{DS} = -20\text{ V}, V_{GS} = -10\text{ V}, I_D = -110\text{ A}$		235	350	nC
Gate-Source Charge ^c	Q_{gs}		45			
Gate-Drain Charge ^c	Q_{gd}		65			
Gate Resistance	R_g			3		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 0.18\text{ }\Omega$ $I_D \cong -110\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\text{ }\Omega$		25	40	ns
Rise Time ^c	t_r			30	45	
Turn-Off Delay Time ^c	$t_{d(off)}$			190	300	
Fall Time ^c	t_f			110	165	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) ^b						
Continuous Current	I_S				- 110	A
Pulsed Current	I_{SM}				- 240	
Forward Voltage ^a	V_{SD}	$I_F = -85\text{ A}, V_{GS} = 0\text{ V}$		- 1.0	- 1.5	V
Reverse Recovery Time	t_{rr}	$I_F = -85\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		65	100	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			- 3.7	- 5.6	A
Reverse Recovery Charge	Q_{rr}			0.12	0.28	μC

Notes:

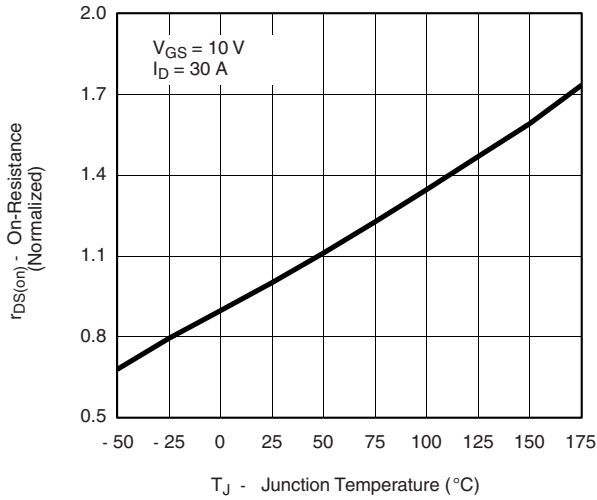
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

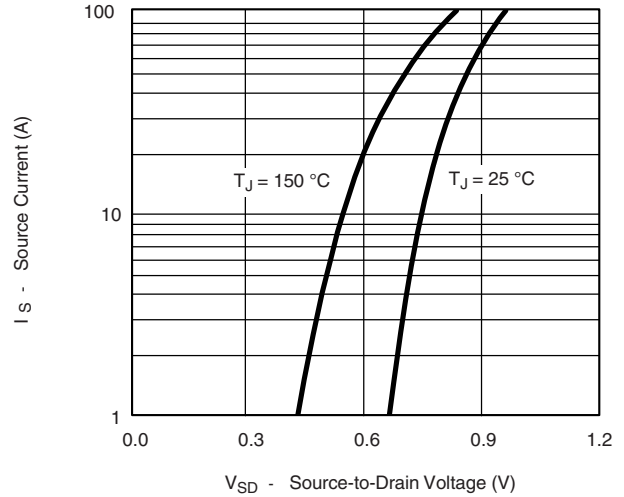
TYPICAL CHARACTERISTICS 25 °C, unless noted



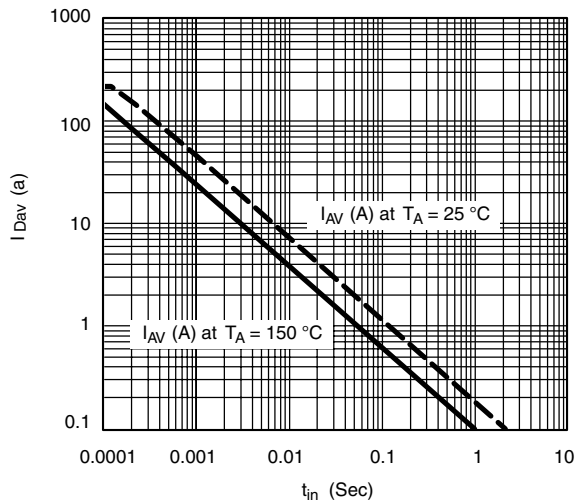
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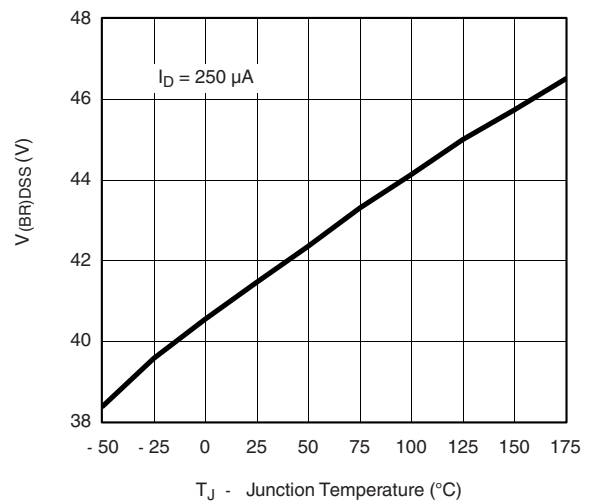
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

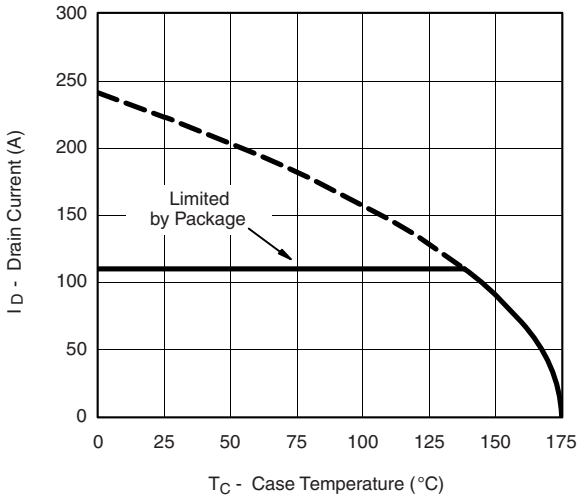


Avalanche Current vs. Time

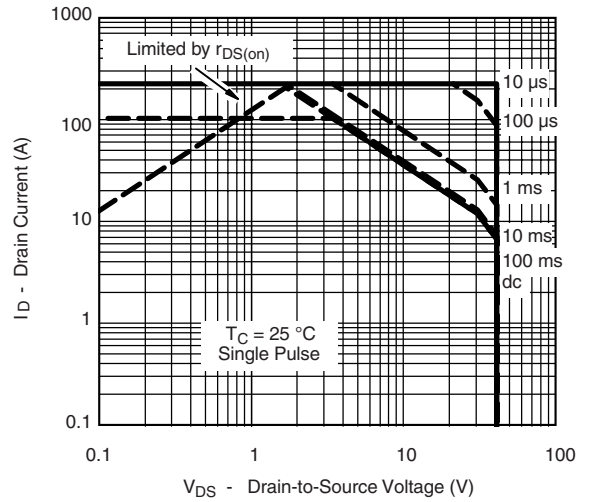


Drain Source Breakdown vs. Junction Temperature

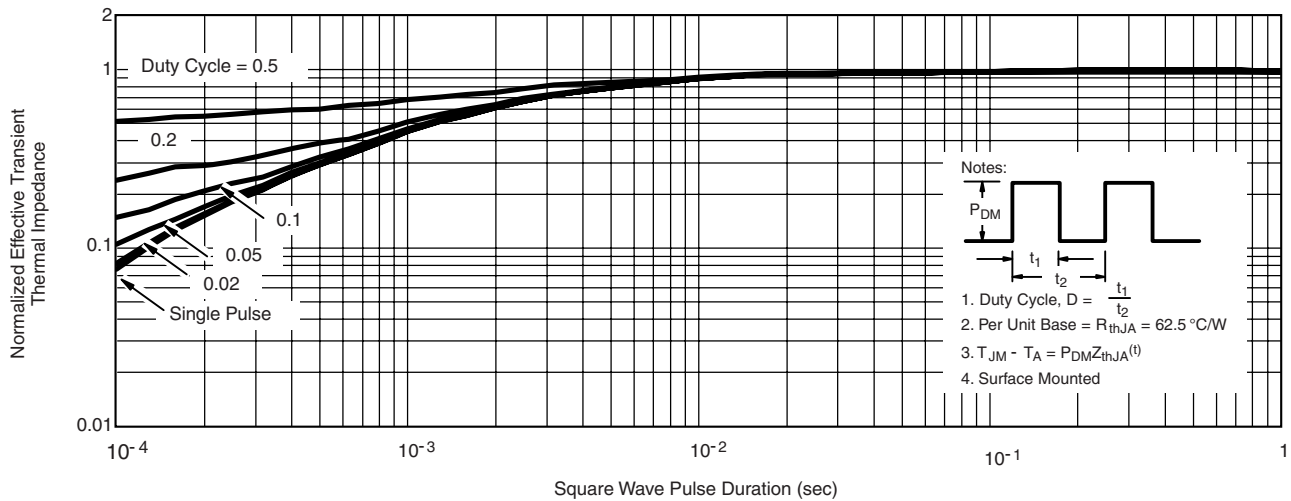
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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