

## P-Channel 40-V (D-S) 175 °C MOSFET

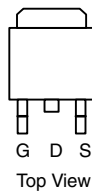
**PRODUCT SUMMARY**

$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>d</sup>
- 40	0.0042 at $V_{GS} = - 10$ V	- 110
	0.0062 at $V_{GS} = - 4.5$ V	- 110

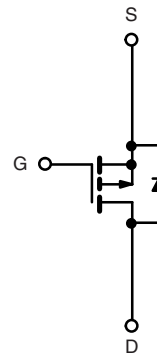
**FEATURES**

- TrenchFET<sup>®</sup> 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	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C) <sup>d</sup>	$I_D$	$T_C = 25$ °C	- 110
		$T_C = 125$ °C	- 110
Pulsed Drain Current	$I_{DM}$	- 240	A
Avalanche Current	$I_{AS}$	- 75	
Single Pulse Avalanche Energy <sup>a</sup>	$E_{AS}$	281	mJ
Power Dissipation	$P_D$	$T_C = 25$ °C	375 <sup>c</sup>
		$T_A = 25$ °C <sup>b</sup>	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 <sup>b</sup>	$R_{thJA}$	40	°C/W
Junction-to-Case	$R_{thJC}$	0.4	

Notes:

- Duty cycle  $\leq 1$  %.
- 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.

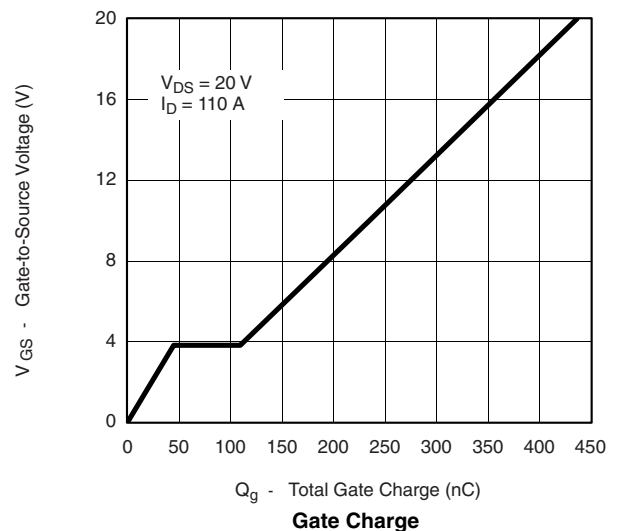
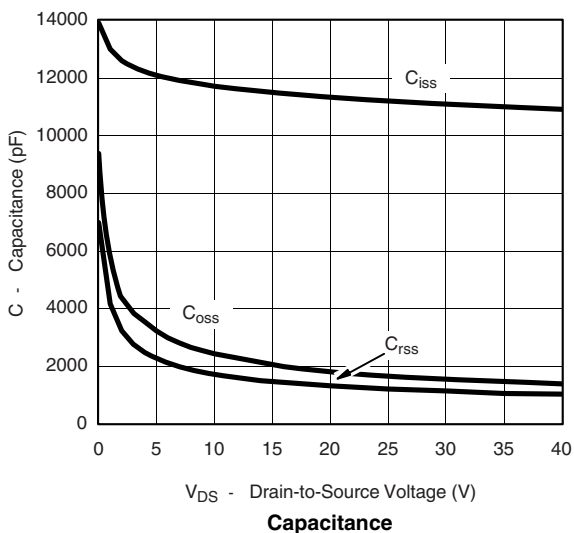
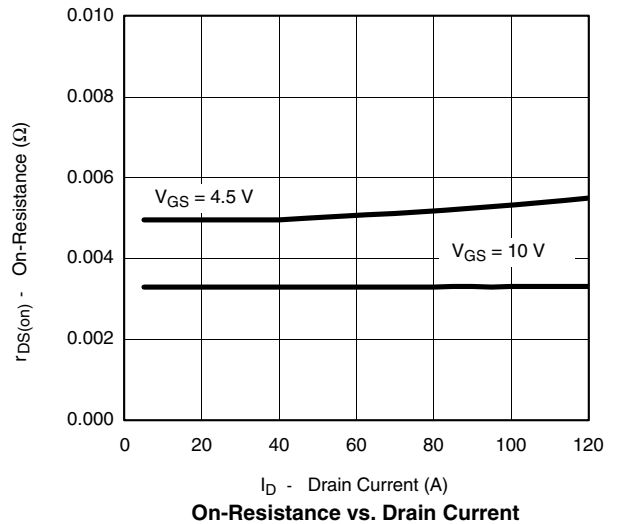
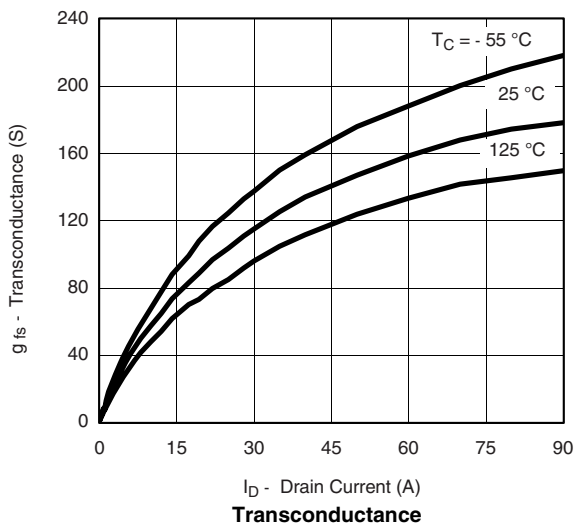
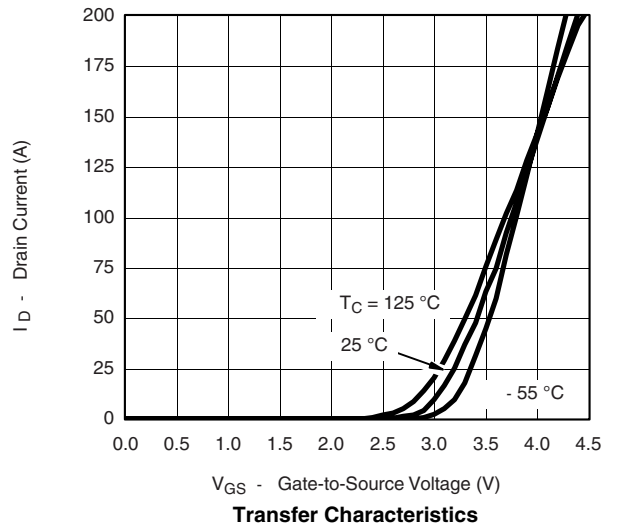
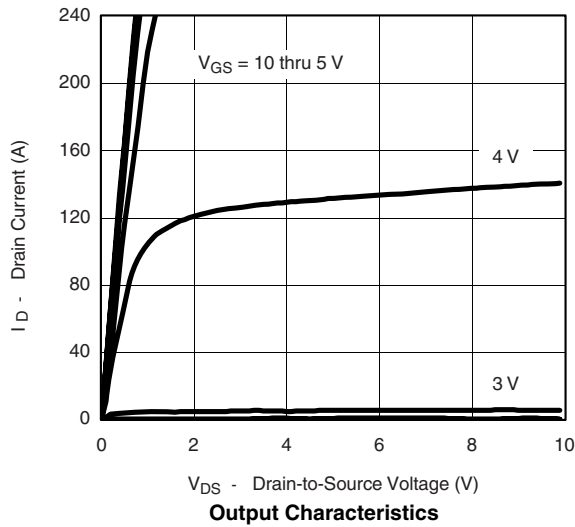


<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}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

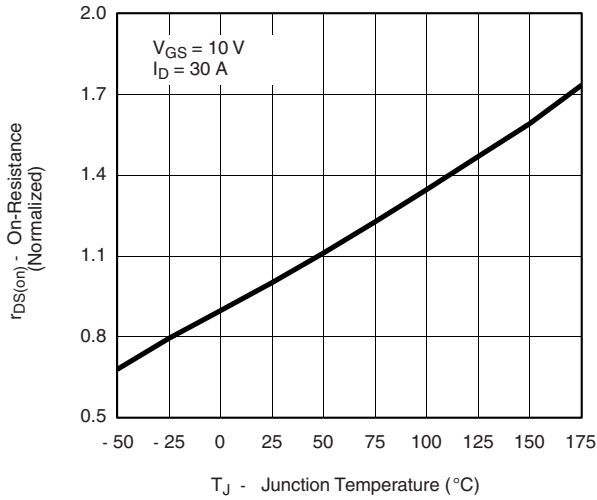
Notes:

- 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.

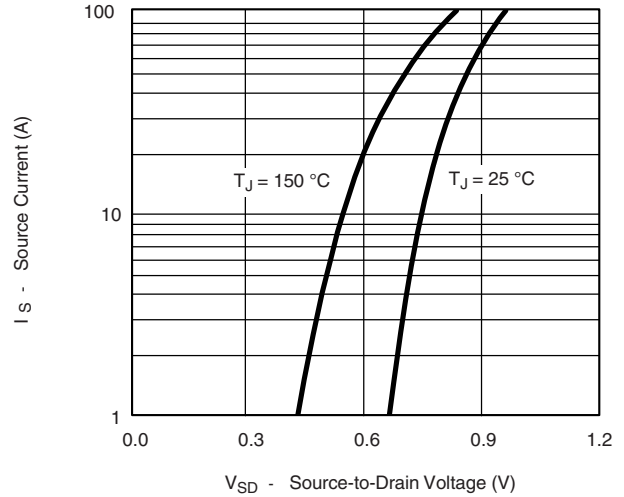
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS** 25 °C, unless noted


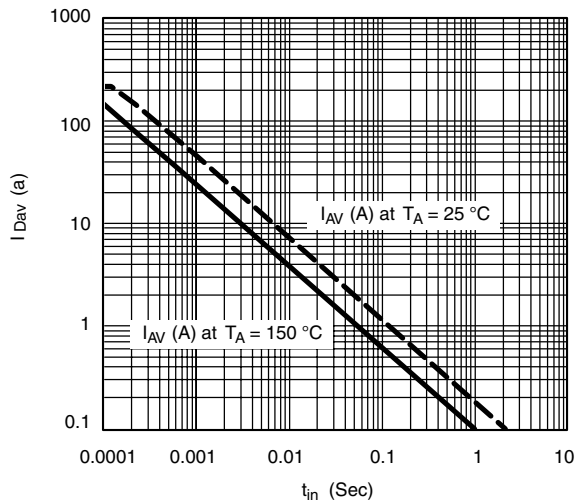
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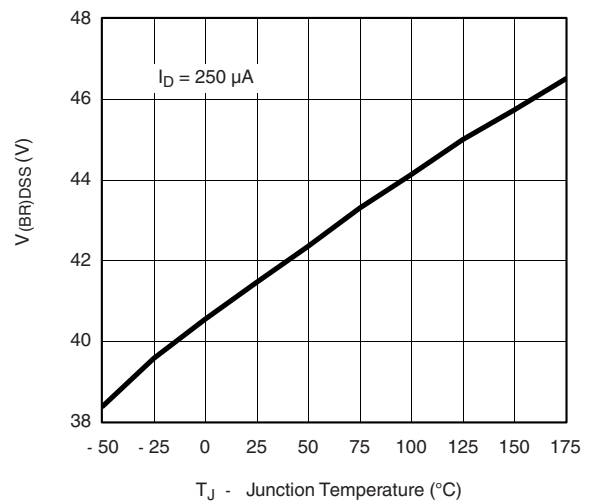
**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**

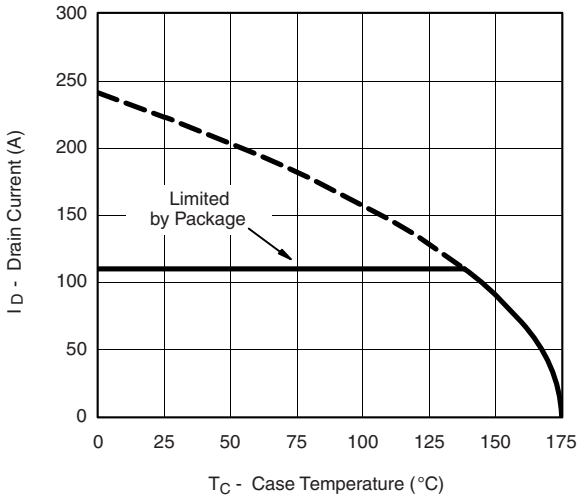


**Avalanche Current vs. Time**

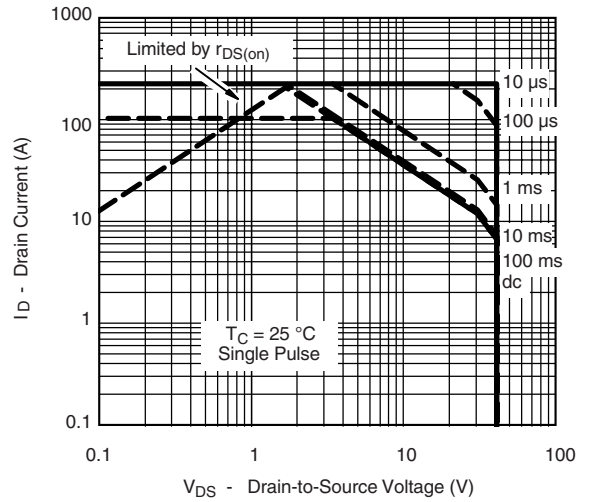


**Drain Source Breakdown vs. Junction Temperature**

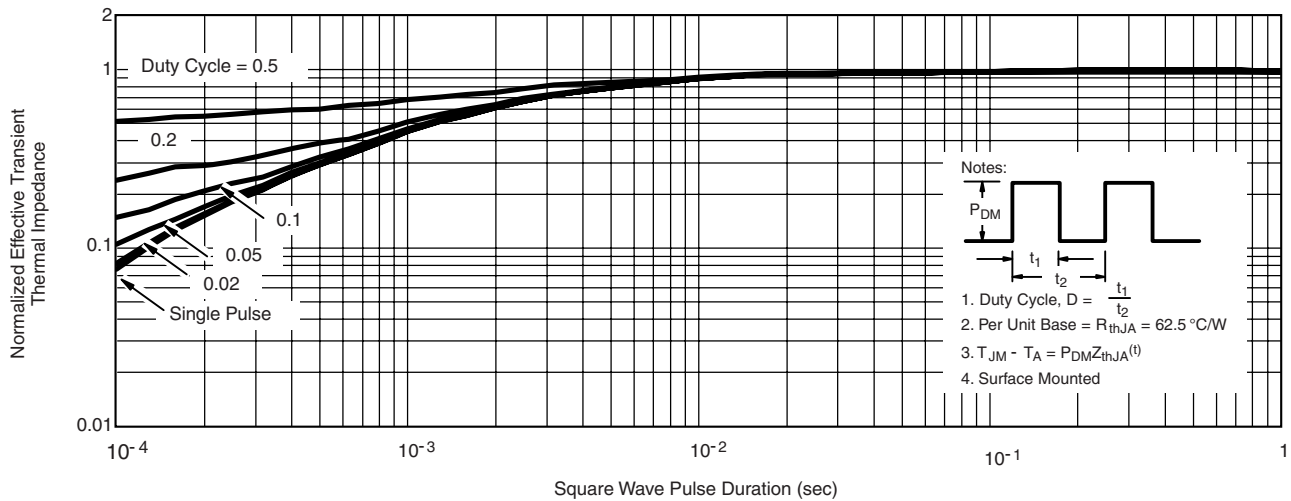
**THERMAL RATINGS**



**Maximum Avalanche and Drain Current vs. Case Temperature**



**Safe Operating Area**



**Normalized Thermal Transient Impedance, Junction-to-Case**

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