



## 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 @ $V_{GS} = -10$ V	-110
	0.0062 @ $V_{GS} = -4.5$ V	-110

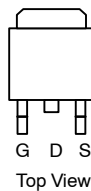
### FEATURES

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

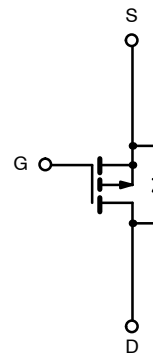
### APPLICATIONS

- Automotive
  - 12-V Boardnet
  - High-Side Switches
  - Motor Drives

TO-263



Ordering Information: SUM110P04-04L



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>d</sup> ( $T_J = 175^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	-110
		$T_C = 125^\circ\text{C}$	-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	$P_D$	$T_C = 25^\circ\text{C}$	375°
		$T_A = 25^\circ\text{C}^b$	3.75
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient PCB Mount <sup>b</sup>	$R_{thJA}$	40	$^\circ\text{C}/\text{W}$
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.

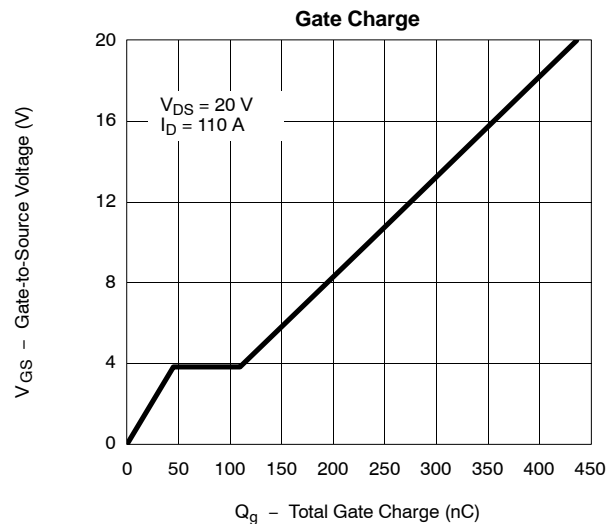
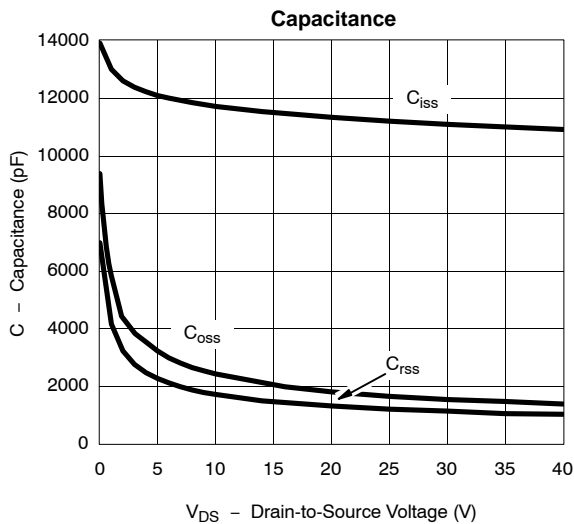
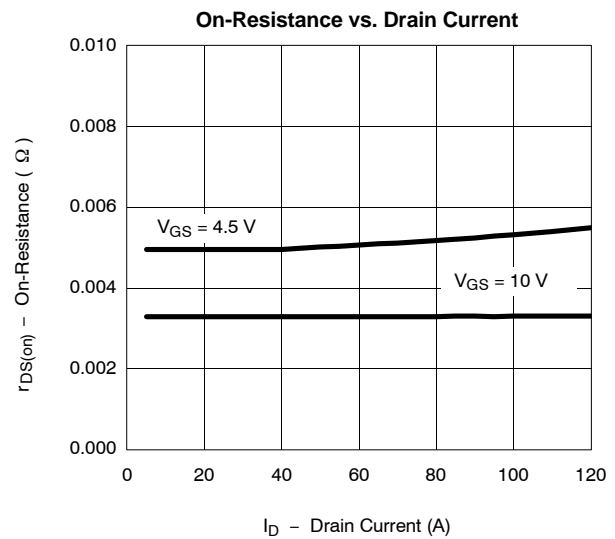
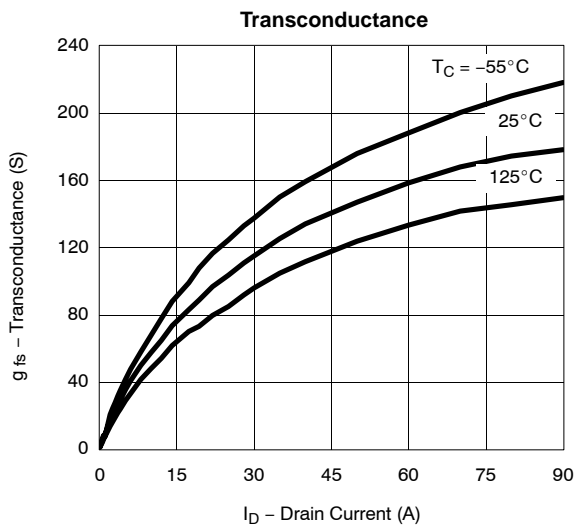
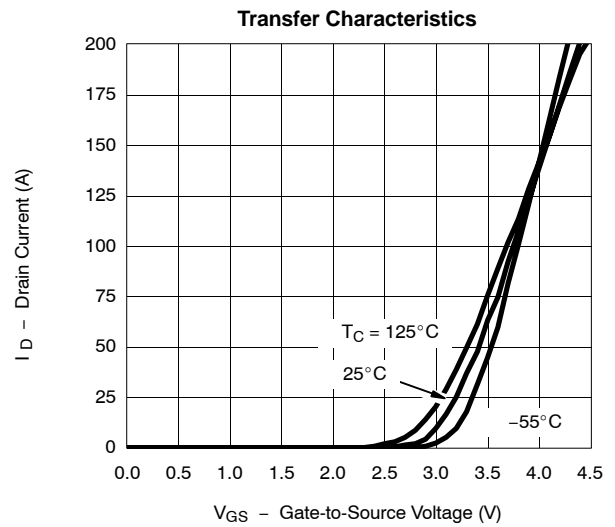
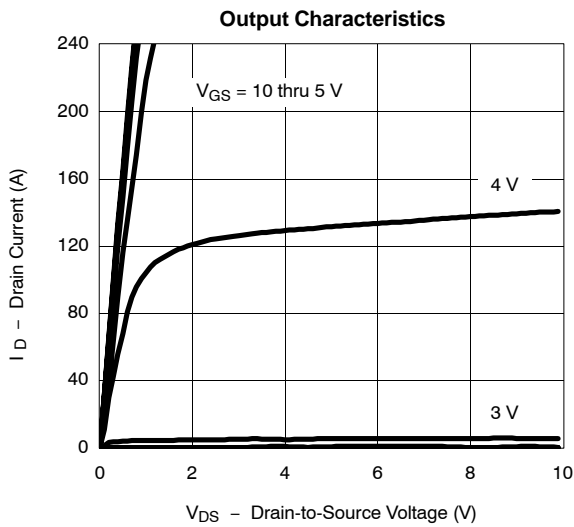
SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-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	$\mu\text{A}$
		$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			-50	
		$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 175^\circ\text{C}$			-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	$\Omega$
		$V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 125^\circ\text{C}$			0.0063	
		$V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 175^\circ\text{C}$			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		pF
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		$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 0.18\ \Omega$ $I_D \approx -110\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\ \Omega$		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 (<math>T_C = 25^\circ\text{C}</math>)<sup>b</sup></b>						
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:

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

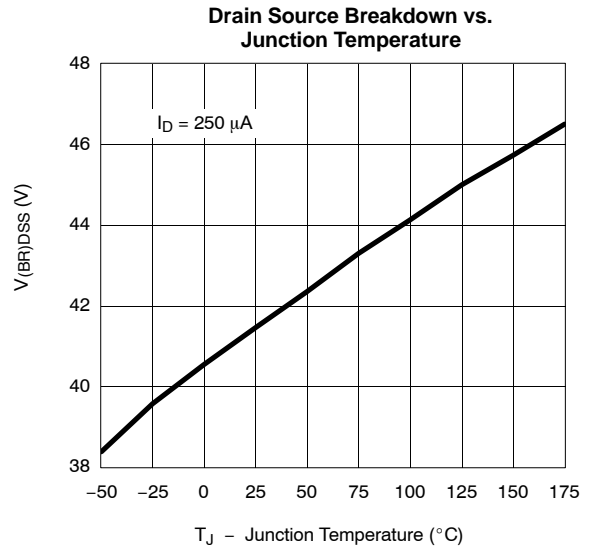
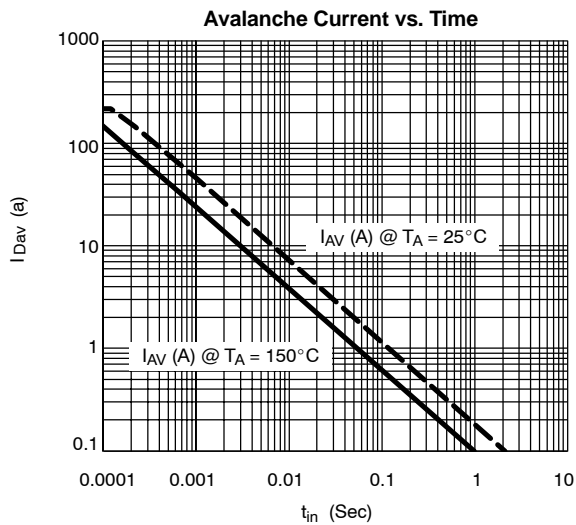
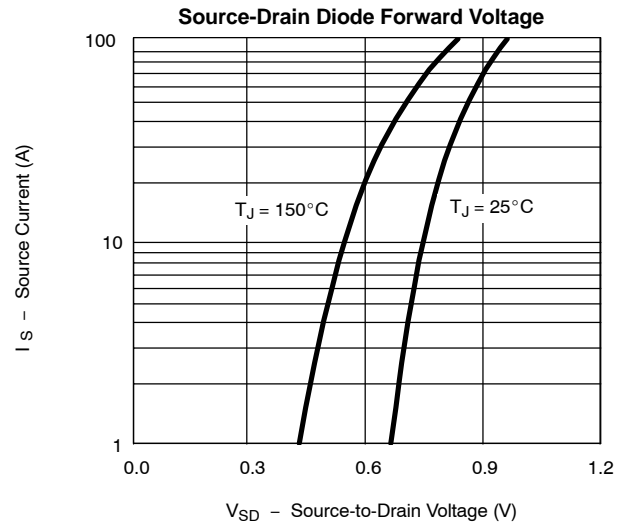
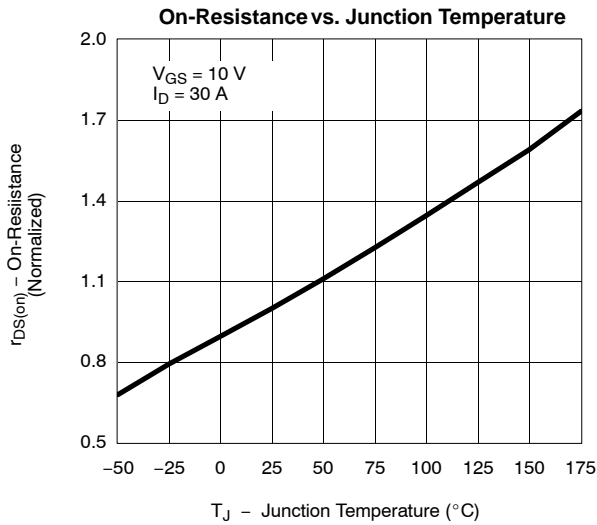


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



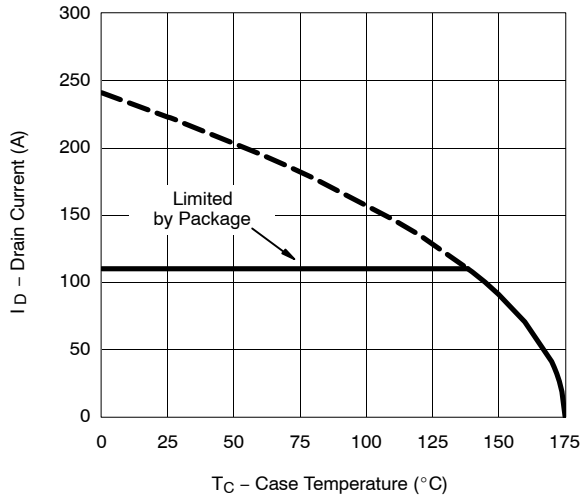


**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

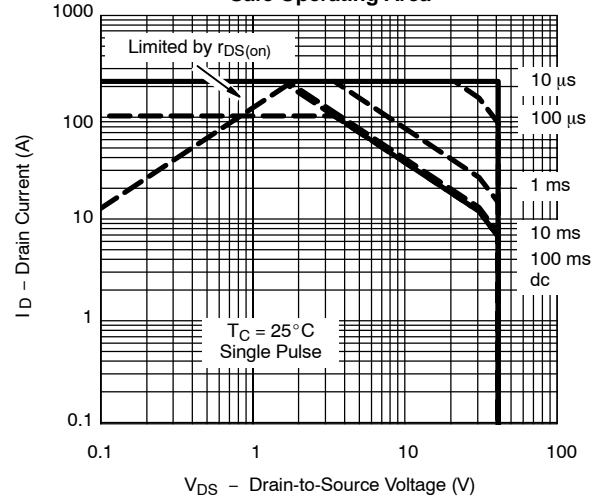


**THERMAL RATINGS**

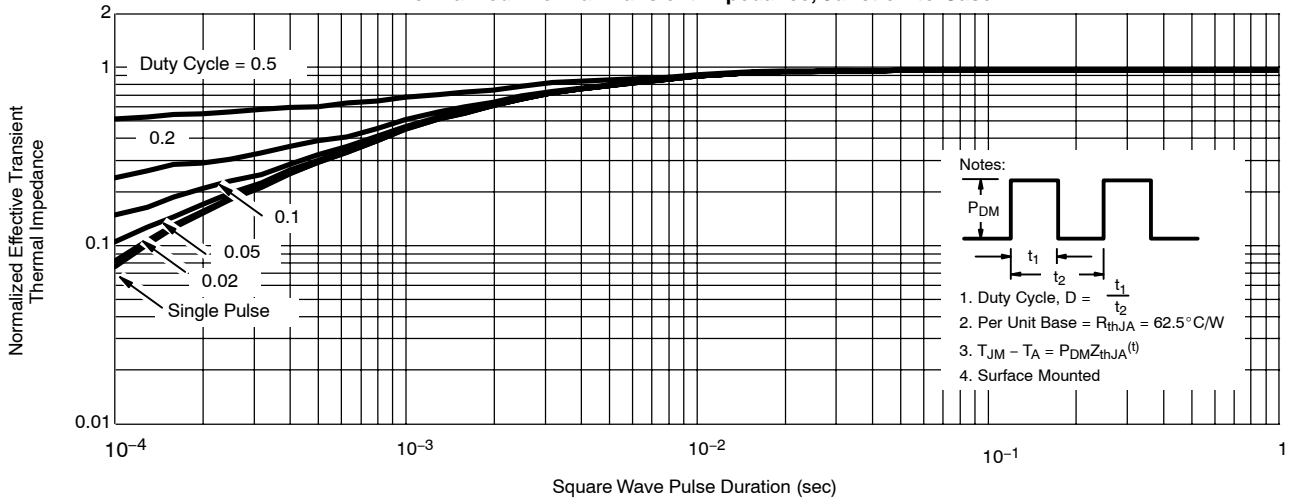
**Maximum Avalanche and Drain Current vs. Case Temperature**



**Safe Operating Area**



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



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