

Siliconix

### N-Channel Enhancement-Mode Transistor, 18-mΩ $r_{DS(on)}$

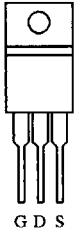
175°C Maximum Junction Temperature<sup>a</sup>

#### Product Summary

$V_{DS}$ (V)	$r_{DS(on)}$ (Ω)	$I_D$ (A)
60	0.018	60

See lower-cost version: SUP50N06-18

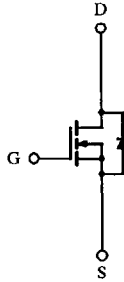
TO-220AB



G D S

Top View

DRAIN connected to TAB



N-Channel MOSFET

#### Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	Limit	Unit
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ\text{C}$	60
		$T_C = 100^\circ\text{C}$	41
Pulsed Drain Current	$I_{DM}$	240	A
Avalanche Current	$I_{AR}$	60	
Avalanche Energy	$E_{AR}$	180	mJ
Repetitive Avalanche Energy <sup>a</sup>			
Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	125
		$T_C = 100^\circ\text{C}$	62
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$
Lead Temperature (1/16" from case for 10 sec.)	$T_L$	300	

#### Thermal Resistance Ratings

Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient	$R_{thJA}$		80	$^\circ\text{C/W}$
Junction-to-Case	$R_{thJC}$		1.2	
Case-to-Sink	$R_{thCS}$	1.0		

Notes:

a. Duty cycle  $\leq 1\%$

## SMP60N06-18

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Specifications ( $T_J = 25^\circ\text{C}$  Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_{DS} = 1\ \text{mA}$	2.0		4.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 500$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$			25	$\mu\text{A}$
		$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			250	
		$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}, T_J = 175^\circ\text{C}$			500	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}$	60			A
Drain-Source On-State Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		0.013	0.018	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 125^\circ\text{C}$		0.023	0.030	
		$V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 175^\circ\text{C}$		0.026	0.036	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 30\text{ A}$		45		S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		2600		$\text{pF}$
Output Capacitance	$C_{oss}$			800		
Reverse Transfer Capacitance	$C_{rss}$			200		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 60\text{ A}$		85	100	$\text{nC}$
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			15	20	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			35	50	
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 1\ \Omega$ $I_D = 30\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\ \Omega$		15	30	$\text{ns}$
Rise Time <sup>c</sup>	$t_r$			20	35	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			50	65	
Fall Time <sup>c</sup>	$t_f$			20	30	
<b>Source-Drain Diode Ratings and Characteristics (<math>T_C = 25^\circ\text{C}</math>)</b>						
Continuous Current	$I_s$				60	A
Pulsed Current	$I_{SM}$				240	
Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 60\text{ A}, V_{GS} = 0\text{ V}$			2.0	V
Reverse Recovery Time	$t_{rr}$			160		ns
Peak Reverse Recovery Current	$I_{RM(REC)}$	$I_F = 60\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$		13		A
Reverse Recovery Charge	$Q_{rr}$			1.0		$\mu\text{C}$

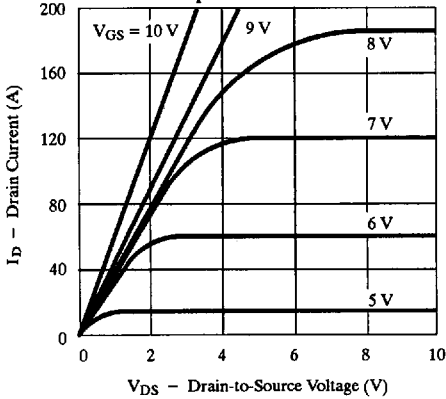
## Notes:

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

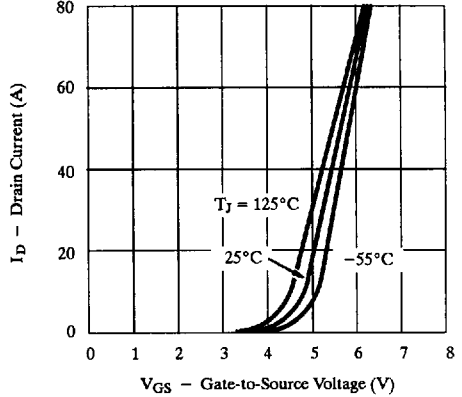
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## Typical Characteristics (25°C Unless Otherwise Noted)

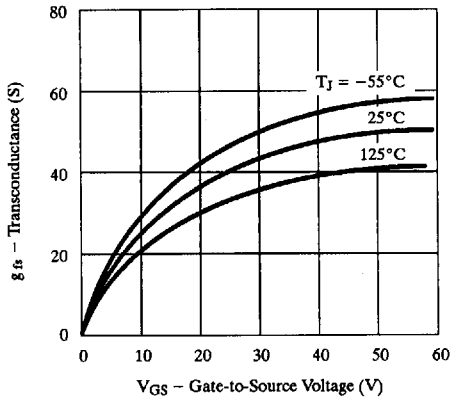
Output Characteristics



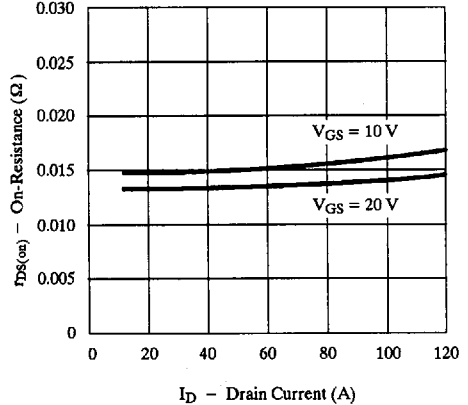
Transfer Characteristics



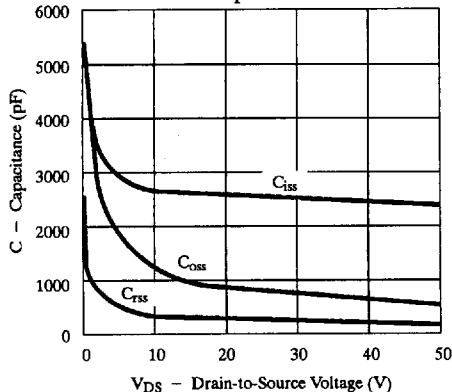
Transconductance



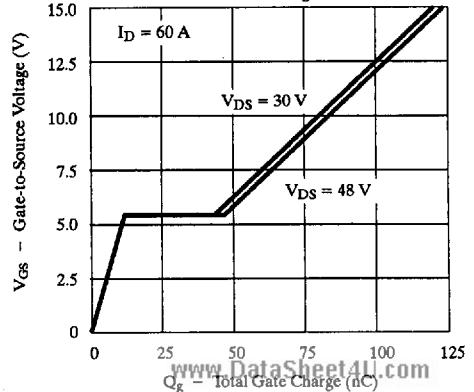
On-Resistance vs. Drain Current



Capacitance



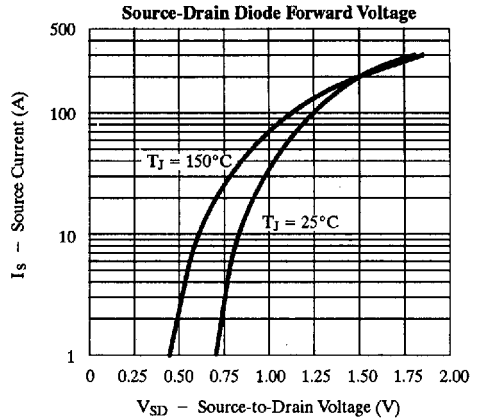
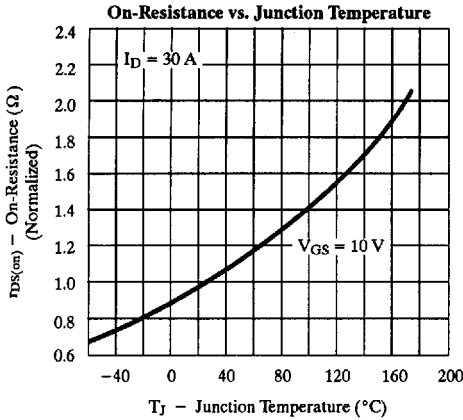
Gate Charge



## SMP60N06-18

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### Typical Characteristics (25°C Unless Otherwise Noted)



### Thermal Ratings

