TEMIC
Semiconductors

SMD10P06L

P-Channel Enhancement-Mode Transistor

Product Summary
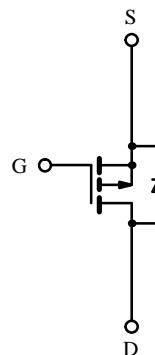
V_{DS} (V)	$r_{DS(on)}$ (Ω)	$I_D{}^a$ (A)
−60	0.28 @ V_{GS} = −10 V	−10
	0.35 @ V_{GS} = −4.5 V	−7.5

175°C Rated Maximum Junction Temperature

DPAK (TO-252)

D

G   S

Top View

S

G

D

P-Channel MOSFET

Absolute Maximum Ratings (T_C = 25°C Unless Otherwise Noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	−60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current[b]	T_A = 25°C	I_D	−2.0	A
	T_A = 100°C		−1.2	
Pulsed Drain Current (maximum current limited by package)		I_{DM}	−16	
Maximum Power Dissipation	T_C = 25°C	P_D	40	W
	T_A = 25°C		2.0[b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 175	°C

Thermal Resistance Ratings

Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient Free Air[b]	R_{thJA}		60	°C/W
Junction-to-Case	R_{thJC}	2.3	3.0	

Notes:
a. Calculated Rating for T_C = 25°C, for comparison purposes only. This cannot be used as continuous rating (see Absolute Maximum Ratings and Typical Characteristics).
b. Surface mounted on PC board or mounted vertically in free air.

Subsequent updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #1405.
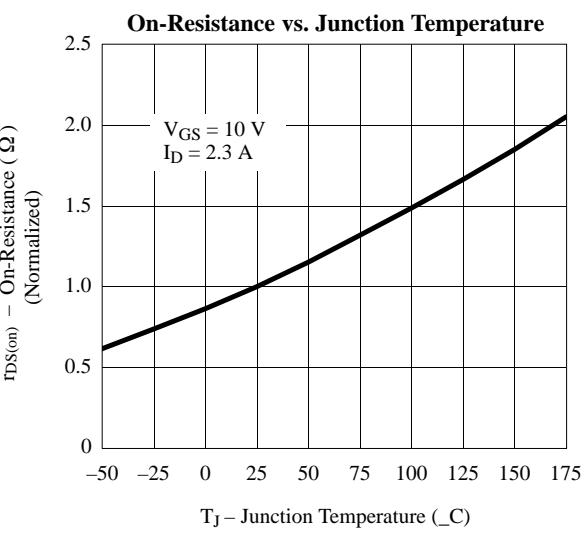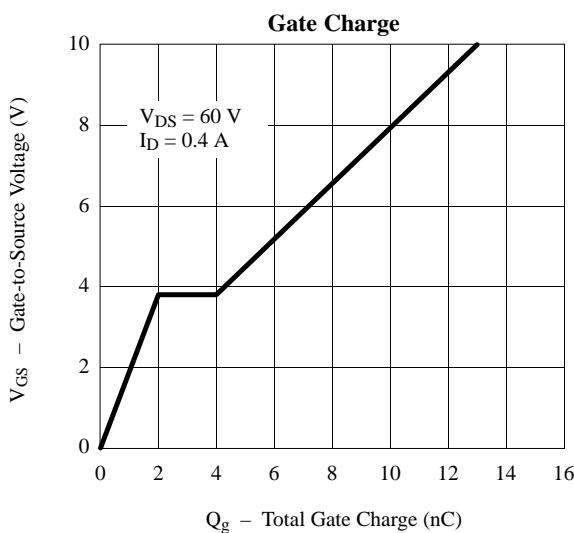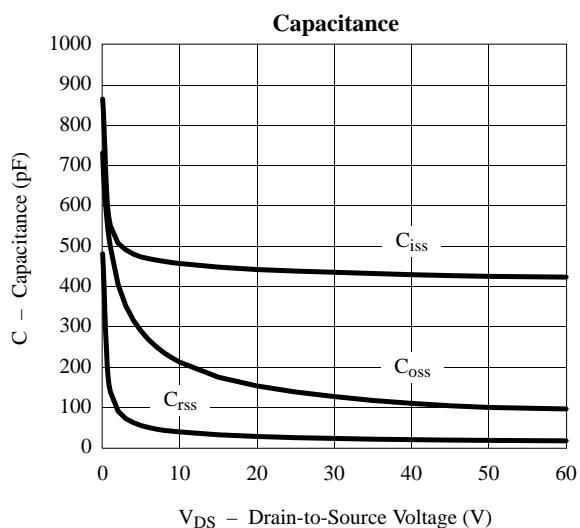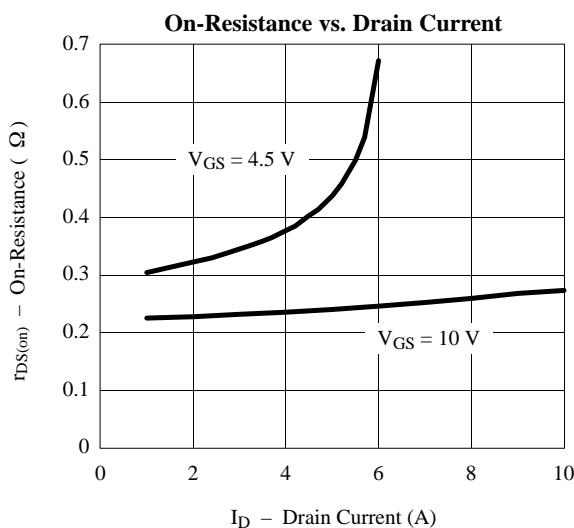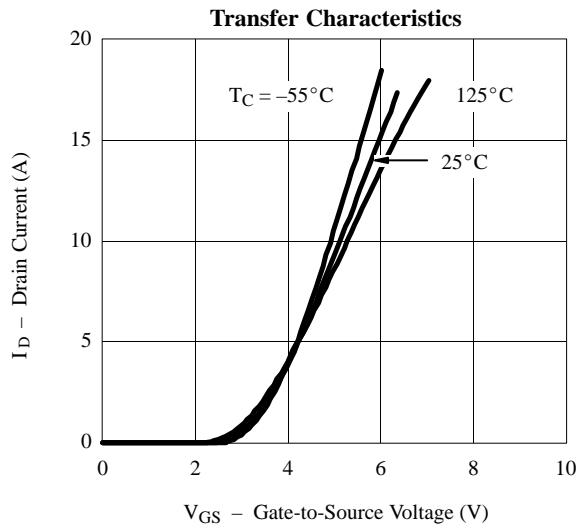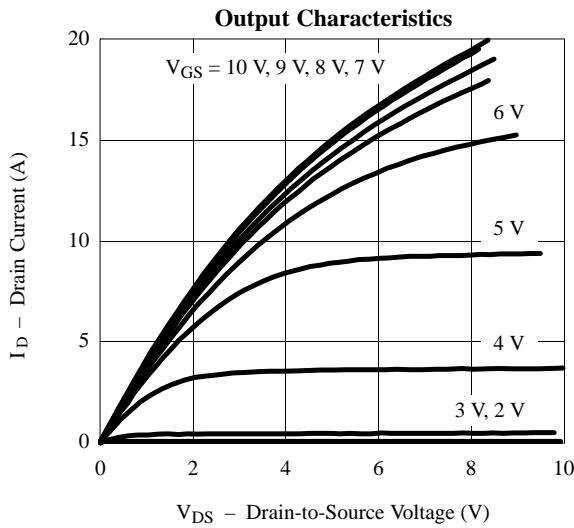
Specifications (T_J = 25°C Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ[a]	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = –250 μA	–60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = –250 μA	–1.0		–3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –48 V, V_{GS} = 0 V			–2	μA
		V_{DS} = –48 V, V_{GS} = 0 V, T_J = 125°C			–100	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = –5 V, V_{GS} = –10 V	–10			A
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = –10 V, I_D = –2.3 A			0.28	Ω
		V_{GS} = –4.5 V, I_D = –1.6 A			0.35	
Forward Transconductance[b]	g_{fs}	V_{DS} = –15 V, I_D = –5 A	1.0			S
Dynamic[a]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = –25 V, f = 1 MHz		440		pF
Output Capacitance	C_{oss}			140		
Reverse Transfer Capacitance	C_{rss}			25		
Total Gate Charge[c]	Q_g	V_{DS} = –30 V, V_{GS} = –10 V, I_D = –10 A		13	24	nC
Gate-Source Charge[c]	Q_{gs}			2.0	4.0	
Gate-Drain Charge[c]	Q_{gd}			4	8.0	
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = –30 V, R_L = 3 Ω I_D ≅ –10 A, V_{GEN} = –10 V, R_G = 25 Ω		15		ns
Rise Time[c]	t_r			50		
Turn-Off Delay Time[c]	$t_{d(off)}$			80		
Fall Time[c]	t_f			80		
Source-Drain Diode Ratings and Characteristics						
Continuous Current	I_S				–2.0	A
Pulsed Current	I_{SM}				–24	
Forward Voltage[b]	V_{SD}	I_F = –2.0 A, V_{GS} = 0 V			–1.2	V
Reverse Recovery Time	t_{rr}	I_F = –2.0 A, di/dt = 100 A/μs		60		ns
Reverse Recovery Charge	Q_{rr}			0.07		μC
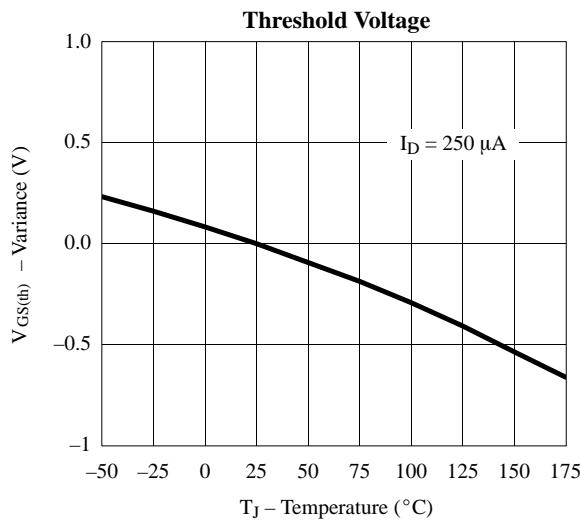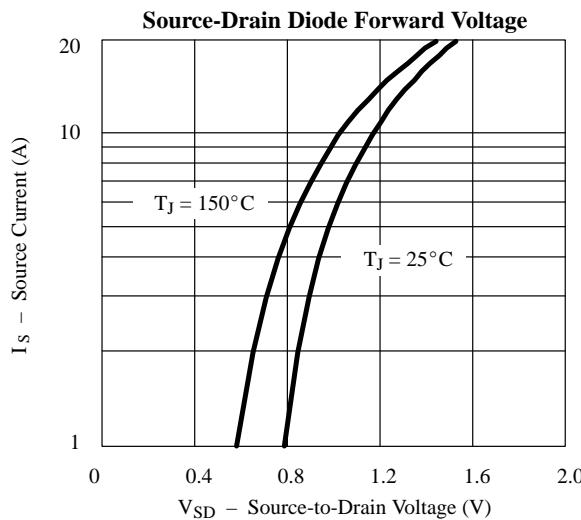
Notes:
a. For design aid only; not subject to production testing.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
c. Independent of operating temperature.

Typical Characteristics (25°C Unless Otherwise Noted)

Output Characteristics

$V_{GS} = 10$ V, 9 V, 8 V, 7 V

6 V

5 V

4 V

3 V, 2 V

I_D – Drain Current (A)

V_{DS} – Drain-to-Source Voltage (V)

Transfer Characteristics

$T_C = -55°C$ 125°C

25°C

I_D – Drain Current (A)

V_{GS} – Gate-to-Source Voltage (V)

On-Resistance vs. Drain Current

$V_{GS} = 4.5$ V

$V_{GS} = 10$ V

$r_{DS(on)}$ – On-Resistance (Ω)

I_D – Drain Current (A)

Capacitance

C_{iss}

C_{oss}

C_{rss}

C – Capacitance (pF)

V_{DS} – Drain-to-Source Voltage (V)

Gate Charge

$V_{DS} = 60$ V
$I_D = 0.4$ A

V_{GS} – Gate-to-Source Voltage (V)

Q_g – Total Gate Charge (nC)

On-Resistance vs. Junction Temperature

$V_{GS} = 10$ V
$I_D = 2.3$ A

$r_{DS(on)}$ – On-Resistance (Ω)
(Normalized)

T_J – Junction Temperature (_C)

Typical Characteristics (25°C Unless Otherwise Noted)

Source-Drain Diode Forward Voltage

I_S – Source Current (A)

$T_J = 150°C$

$T_J = 25°C$

V_{SD} – Source-to-Drain Voltage (V)

Threshold Voltage

$V_{GS(th)}$ – Variance (V)

$I_D = 250$ μA

T_J – Temperature (°C)

Thermal Ratings

Maximum Drain Current vs. Case Temperature

Drain Current (A)

T_C – Case Temperature (°C)

Safe Operating Area

I_D – Drain Current (A)

Limited
by $r_{DS(on)}$

10 us
100 us
1 ms
10 ms
100 ms

1 s

$T_C = 25°C$
Single Pulse

dc

V_{DS} – Drain-to-Source Voltage (V)

Normalized Thermal Transient Impedance, Junction-to-Case

Normalized Effective Transient
Thermal Impedance

Duty Cycle = 0.5

0.2

0.1

0.05

0.02

Single Pulse

Square Wave Pulse Duration (sec)