TEMIC

Siliconix

MOD500B/500C
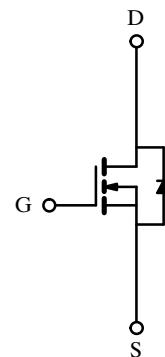
Four N-Channel Enhancement-Mode Transistors

Product Summary

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
500	0.43	13

Leadform Options

MOD500B . . . . Bent Down
MOD500C . . . . Bent Up

N-Channel MOSFET

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

Parameter		Symbol	Single Die	All Die	Unit
Drain-Source Voltage		V_{DS}	500	500	V
Gate-Source Voltage		V_{GS}	± 20	± 20	
Continuous Drain Current ($T_J = 150°C$)	$T_C = 25°C$	I_D	13	41	A
	$T_C = 100°C$		8	26	
Pulsed Drain Current		I_{DM}	52	164	
Avalanche Current		I_A	13		
Maximum Power Dissipation	$T_C = 25°C$	P_D	150	400	W
	$T_C = 100°C$		60	160	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150		°C
Isolation Voltage		V_{ISOL}	1000		V

Thermal Resistance Ratings

| Parameter	Symbol	Typical	Single Die	All Die	Unit
Maximum Junction-to-Ambient	R_{thJA}		30	30	°C/W
Maximum Junction-to-Case	R_{thJC}		0.83	0.31	
Case-to-Sink	R_{thCS}	0.1			
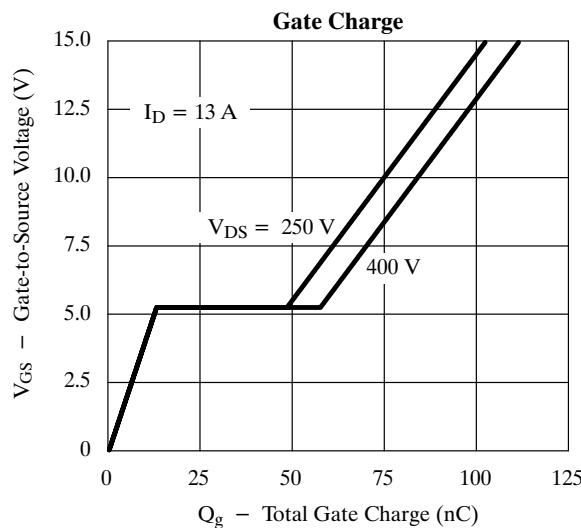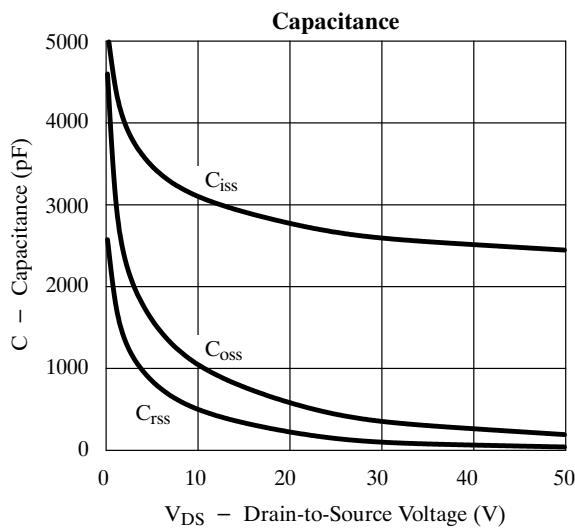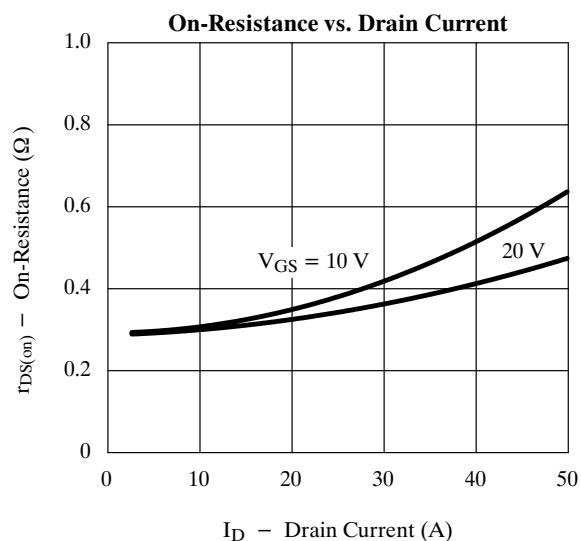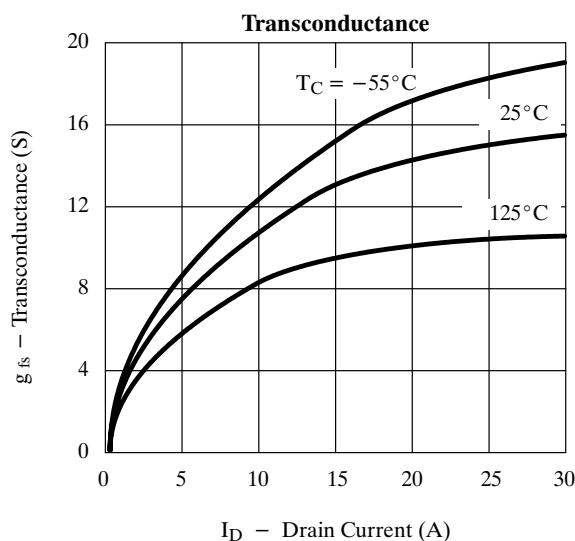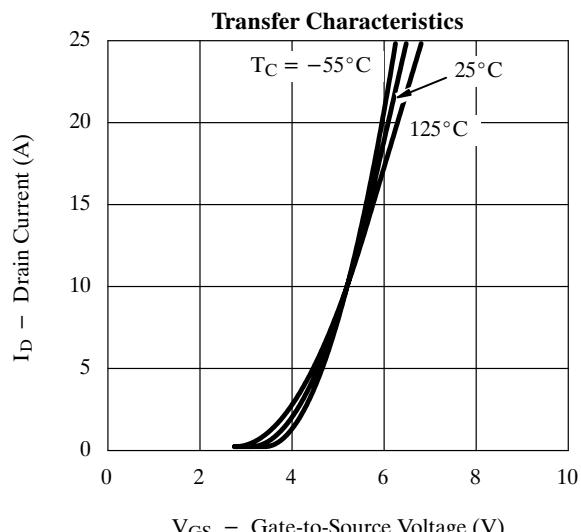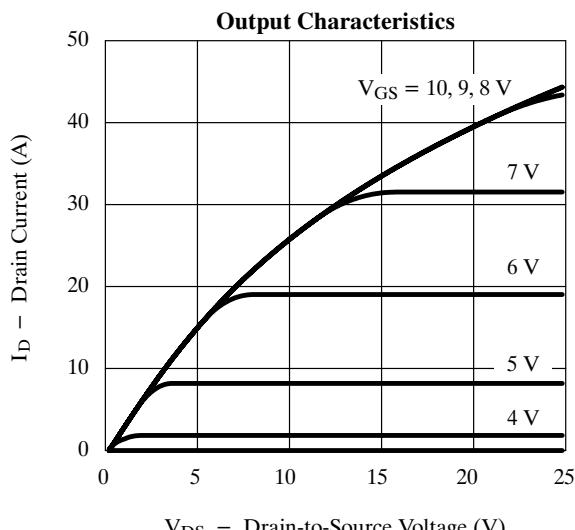
Specifications (T_J = 25°C Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA	500			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2.0		4.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V			250	µA
		V_{DS} = 400 V, V_{GS} = 0 V, T_J = 125°C			1000	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 10 V, V_{GS} = 10 V	13			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 7 A		0.33	0.43	Ω
		V_{GS} = 10 V, I_D = 7 A, T_J = 125°C		0.66	0.88	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 7 A	6.0	9.0		S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		2700		pF
Output Capacitance	C_{oss}			410		
Reverse Transfer Capacitance	C_{rss}			140		
Total Gate Charge[b]	Q_g	V_{DS} = 250 V, V_{GS} = 10 V, I_D = 13 A		90	120	nC
Gate-Source Charge[b]	Q_{gs}			12	19	
Gate-Drain Charge[b]	Q_{gd}			47	70	
Turn-On Delay Time[b]	$t_{d(on)}$	V_{DD} = 210 V, R_L = 30 Ω, I_D ≅ 7 A, V_{GEN} = 10 V, R_G = 4.7 Ω		13	35	ns
Rise Time[b]	t_r			26	50	
Turn-Off Delay Time[b]	$t_{d(off)}$			55	150	
Fall Time[b]	t_f			17	70	
Source-Drain Diode Ratings and Characteristics						
Continuous Current	I_S				13	A
Pulsed Current	I_{SM}				52	
Diode Forward Voltage[a]	V_{SD}	I_F = 13 A, V_{GS} = 0 V			2.0	V
Reverse Recovery Time	t_{rr}	I_F = 13 A, di/dt = 100 A/µs		300		ns
Reverse Recovery Charge	Q_{rr}			2.0		µC
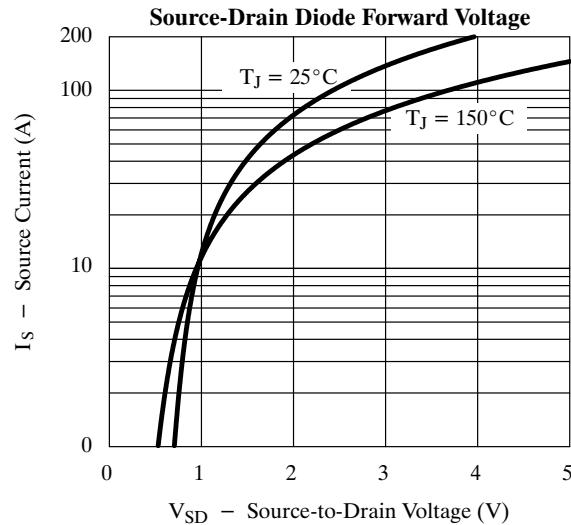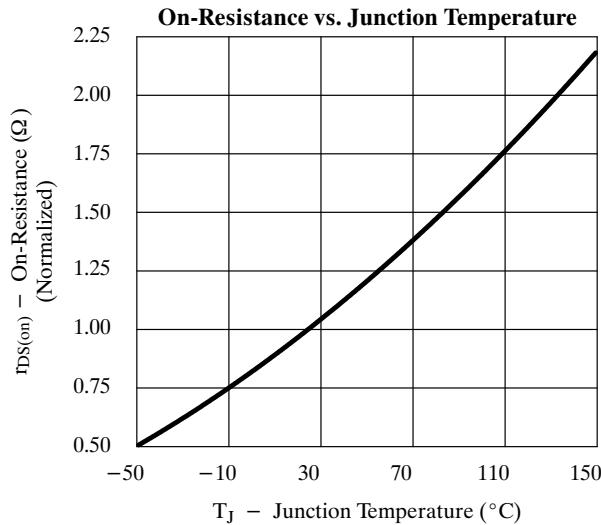
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Independent of operating temperature.

Typical Characteristics (25°C Unless Otherwise Noted)

Output Characteristics

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

7 V

6 V

5 V

4 V

I_D − Drain Current (A)

V_{DS} − Drain-to-Source Voltage (V)

Transfer Characteristics

$T_C = -55°C$

25°C

125°C

I_D − Drain Current (A)

V_{GS} − Gate-to-Source Voltage (V)

Transconductance

$T_C = -55°C$

25°C

125°C

g_{fs} − Transconductance (S)

I_D − Drain Current (A)

On-Resistance vs. Drain Current

$V_{GS} = 10$ V

20 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

$I_D = 13$ A

$V_{DS} = 250$ V

400 V

V_{GS} − Gate-to-Source Voltage (V)

Q_g − Total Gate Charge (nC)

Typical Characteristics (25°C Unless Otherwise Noted)

On-Resistance vs. Junction Temperature

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

T_J − Junction Temperature (°C)

Source-Drain Diode Forward Voltage

I_S − Source Current (A)

$T_J = 25°C$

$T_J = 150°C$

V_{SD} − Source-to-Drain Voltage (V)

Thermal Ratings

Maximum Avalanche and Drain Current vs. Case Temperature

I_D − Drain Current (A)

T_C − Case Temperature (°C)

Safe Operating Area

I_D − Drain Current (A)

Limited by $r_{DS(on)}$

10 µs

100 µs

1 ms

10 ms

100 ms

dc

$T_C = 25°C$
Single Pulse

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)