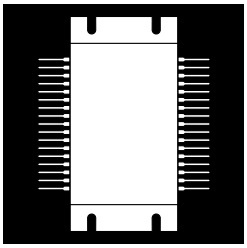
3 PHASE, LOW VOLTAGE, LOW $R_{DS(on)}$, MOSFET BRIDGE CIRCUIT IN A PLASTIC PACKAGE



Three Phase, 200 Volt, 15 To 45 Amp Bridge With Current And Temperature Sensing In A Low Profile Package

FEATURES

- Three Phase Power Switch Configuration
- Zener Gate Protection
- 10 Miliohm Shunt Resistor
- Linear Thermal Sensor
- Isolated Low Profile Package
- Output Currents Up To 45 Amps

DESCRIPTION

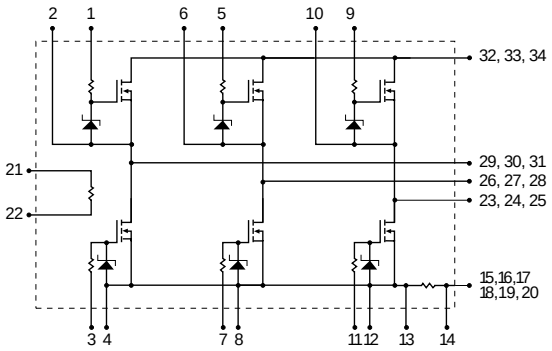
This series of MOSFET switches is configured in a 3 phase bridge with a common V_{DD} line, precision series shunt resistor in the source line, and a sensing element to monitor the substrate temperature. This device is ideally suited for Motor Control applications where size, performance, and efficiency are key.

2.1

MAXIMUM RATINGS (@ 25°C)

Part Number	V_{DS} (Volts)	$R_{DS(on)}$ (m)	I_D (Amps)	Package
OMS420	200	85	15	MP-3
OMS420A	200	85	20	MP-3
OMS520	200	42	45	MP-3

SCHEMATIC



ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Parameter		OMS420	OMS520	OMS620	Units
V_{DS}	Drain-Source Voltage	200	200	200	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 m)	200	200	200	V
I_D @ T_C = 25°C	Continuous Drain Current	15	20	45	A
I_D @ T_C = 70°C	Continuous Drain Current	11	16	25	A
I_{DM}	Pulsed Drain Current [1]	56	100	140	A
P_D @ T_C = 25°C	Maximum Power Dissipation [2]	20	34	85	W
P_D @ T_C = 70°C	Maximum Power Dissipation [2]	13	13	27	W
Junction-To-Case Linear Derating Factor		0.5	0.5	1.0	W/°C
Thermal Resistance Junction-To-Case		2.0	2.0	1.0	°C/W

Note 1: Pulse Test: Pulse width 300 sec. Duty Cycle 1.5%.
Note 2: Maximum Junction Temperature equal to 125°C.

ELECTRICAL CHARACTERISTICS: OMS420 (T_C = 25° unless otherwise specified)

Characteristic	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage, I_D = 250 µA, V_{GS} = 0		V_{BRDSS}	200	-	-	V
Zero Gate Voltage Drain Current = V_{GS}, V_{DS} = Max. Rat.		I_{DSS}	-	-	25	µA
	V_{DS} = Max. Rat. x 0.8, T_C = 70°C		-	-	1000	µA
Gate-Body Leakage, V_{GS} = ±12 V		I_{GSS}	-	-	±500	nA
ON CHARACTERISTICS						
Gate-Threshold Voltage, V_{DS} = V_{GS}, I_D = 250 µA		V_{GSth}	2.0	-	4.0	V
Static Drain-Source On-Resistance, V_{GS} = 10 Vdc, I_D = 9.0 A		R_{DSon}	-	-	0.85	
	T_C = 70°C		-	-	0.17	
On State Drain Current, V_{DS} > $I_{D(on)}$ X $R_{DS(on)}$ Max., V_{GS} = 10		I_{Don}	15	-	-	A
DYNAMIC CHARACTERISTICS						
Forward Transconductance	V_{DS} > $I_{D(on)}$ X $R_{DS(on)}$ Max., I_D = 9.0 A,	g_{fs}	12	-	-	mho
Input Capacitance	V_{DS} = 25 V,	C_{iss}	-	-	5000	pF
Output Capacitance	V_{GS} = 0,	C_{oss}	-	-	250	pF
Reverse Transfer Capacitance	f = 1.0 mHz	C_{rss}	-	-	1000	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time		t_{don}	-	-	50	ns
Rise Time	V_{DD} = 100 V, I_D = 15 A,	t_r	-	-	240	ns
Turn-Off Delay Time	R_{GS} = 50 , V_{GS} = 10 V	t_{doff}	-	-	150	ns
Fall Time		t_f	-	-	1820	ns
SOURCE DRAIN DIODE CHARACTERISTICS						
Source - Drain Current		I_{SD}	-	-	14	A
Source - Drain Current (Pulsed)		I_{SDM}*	-	-	56	A
Forward On-Voltage	I_{SD} = 15 A, V_{GS} = 0,	V_{SD}	-	-	2.0	V
Reverse Recovery Time	I_{SD} = 13 A, di/dt = 100 A/µSec	t_{rr}	-	280	-	ns
Reverse Recovered Charge		Q_{rr}	-	2.94	-	µC
RESISTOR CHARACTERISTICS						
Resistor Tolerance		R_S	9.0	10	11	m
Temperature Coefficient, -40°C to +70°C		T_{cr}	-	100	-	ppm

* Indicates Pulse Test 300 µsec, Duty Cycle 1.5%

ELECTRICAL CHARACTERISTICS: OMS520 (T_C = 25° unless otherwise specified)

Characteristic		Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage, I_D = 250 µA, V_{GS} = 0		$V_{(BRDSS}$	200	-	-	V
Zero Gate Voltage Drain Current = V_{GS}, V_{DS} = Max. Rat.		I_{DSS}	-	-	25.0	µA
V_{DS} = Max. Rat. x 0.8, T_C = 70°C			-	-	500.0	µA
Gate-Body Leakage, V_{GS} = ±12 V		I_{GSS}	-	-	±500	nA
ON CHARACTERISTICS						
Gate-Threshold Voltage, V_{DS} = V_{GS}, I_D = 250 µA		$V_{GS(th)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, V_{GS} = 10 Vdc, I_D = 10 A		$R_{DS(on)}$	-	-	0.085	
T_C = 70°C			-	-	0.17	
On State Drain Current, V_{DS} > $I_{D(on)}$ X $R_{DS(on)}$ Max., V_{GS} = 10		$I_{D(on)}$	20	-	-	A
DYNAMIC CHARACTERISTICS						
Forward Transconductance	V_{DS} > $I_{D(on)}$ X $R_{DS(on)}$ Max., I_D = 10 A	g_{fs}	12	-	-	mho
Input Capacitance	V_{DS} = 25 V,	C_{iss}	-	-	5000	pF
Output Capacitance	V_{GS} = 0,	C_{oss}	-	-	250	pF
Reverse Transfer Capacitance	f = 1.0 mHz	C_{rss}	-	-	1000	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time		$t_{d(on)}$	-	-	50	ns
Rise Time	V_{DD} = 100 V, I_D = 20 A,	t_r	-	-	240	ns
Turn-Off Delay Time	R_{GS} = 6.2 , V_{GS} = 10 V	$t_{d(off)}$	-	-	150	ns
Fall Time		t_f	-	-	182	ns
SOURCE DRAIN DIODE CHARACTERISTICS						
Source - Drain Current		I_{SD}	-	-	20	A
Source - Drain Current (Pulsed)	I_{SD} = 20 A, V_{GS} = 0,	I_{SDM}*	-	-	100	A
Forward On-Voltage	I_{SD} = 20 A,	V_{SD}	-	-	2.0	V
Reverse Recovery Time	di/dt = 100 A/µSec	t_{rr}	-	280	-	ns
Reverse Recovered Charge		Q_{rr}	-	2.94	-	µC
RESISTOR CHARACTERISTICS						
Resistor Tolerance		R_S	9.0	10	11	m
Temperature Coefficient, -40°C to +70°C		T_{cr}	-	100	-	ppm

* Indicates Pulse Test 300 µsec, Duty Cycle 1.5%.

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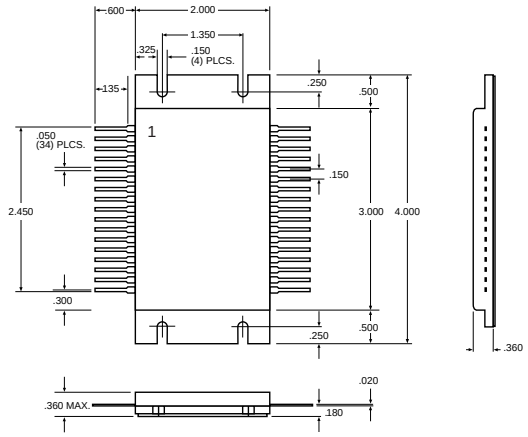
ELECTRICAL CHARACTERISTICS: OMS620 (T_C = 25° unless otherwise specified)

Characteristic		Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage, I_D = 250 µA, V_{GS} = 0		$V_{(BRDSS}$	200	-	-	V
Zero Gate Voltage Drain Current = V_{GS}, V_{DS} = Max. Rat.		I_{DSS}	-	-	250	µA
V_{DS} = Max. Rat. x 0.8, T_C = 70°C			-	-	750	µA
Gate-Body Leakage, V_{GS} = ±12 V		I_{GSS}	-	-	±1.0	nA
ON CHARACTERISTICS						
Gate-Threshold Voltage, V_{DS} = V_{GS}, I_D = 250 µA		$V_{GS(th)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, V_{GS} = 10 Vdc, I_D = 22.5 A		$R_{DS(on)}$	-	-	0.042	
T_C = 70°C			-	-	0.085	
On State Drain Current, V_{DS} > $I_{D(on)}$ X $R_{DS(on)}$ Max., V_{GS} = 10		$I_{D(on)}$	45	-	-	A
DYNAMIC CHARACTERISTICS						
Forward Transconductance	V_{DS} > $I_{D(on)}$ X $R_{DS(on)}$ Max., I_D = 40 A	g_{fs}	25	-	-	mho
Input Capacitance	V_{DS} = 25 V,	C_{iss}	-	-	10000	pF
Output Capacitance	V_{GS} = 0,	C_{oss}	-	-	500	pF
Reverse Transfer Capacitance	f = 1.0 mHz	C_{rss}	-	-	2000	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time		$t_{d(on)}$	-	-	50	ns
Rise Time	V_{DD} = 200 V, I_D = 45 A,	t_r	-	-	240	ns
Turn-Off Delay Time	R_{GS} = 6.2 , V_{GS} = 10 V,	$t_{d(off)}$	-	-	150	ns
Fall Time		t_f	-	-	182	ns
SOURCE DRAIN DIODE CHARACTERISTICS						
Source - Drain Current		I_{SD}	-	-	45	A
Source - Drain Current (Pulsed)		I_{SDM}*	-	-	150	A
Forward On-Voltage	I_{SD} = 45 A, V_{GS} = 0,	V_{SD}	-	-	2.0	V
Reverse Recovery Time	I_{SD} = 45 A,	t_{rr}	-	280	-	ns
Reverse Recovered Charge	di/dt = 100 A/µSec	Q_{rr}	-	5.88	-	µC
RESISTOR CHARACTERISTICS						
Resistor Tolerance		R_S	9.0	10	11	m
Temperature Coefficient, -40°C to +70°C		T_{cr}	-	100	-	ppm

* Indicates Pulse Test 300 µsec, Duty Cycle 1.5%.

Mechanical Outline



Pin 1: Gate Q1	Pin 34: V_{DD}
Pin 2: Source Q1	Pin 33: V_{DD}
Pin 3: Gate Q2	Pin 32: V_{DD}
Pin 4: Source Q2	Pin 31: Output Phase A
Pin 5: Gate Q3	Pin 30: Output Phase A
Pin 6: Source Q3	Pin 29: Output Phase A
Pin 7: Gate Q4	Pin 28: Output Phase B
Pin 8: Source Q4	Pin 17: Output Phase B
Pin 9: Gate Q5	Pin 26: Output Phase B
Pin 10: Source Q5	Pin 25: Output Phase C
Pin 11: Gate Q6	Pin 24: Output Phase C
Pin 12: Source Q6	Pin 23: Output Phase C
Pin 13: +Sense Res.	Pin 22: +PTC
Pin 14: -Sense Res.	Pin 21: -PTC
Pin 15: Power GND	Pin 20: Power GND
Pin 16: Power GND	Pin 19: Power GND
Pin 17: Power GND	Pin 18: Power GND

Notes: •Contact factory for lead bending options.

•Mounting Recommendations: Maximum Mounting Torque: 3.0 mN.
The module must be attached to a flat heat sink (flatness 100mm maximum).