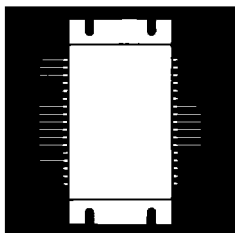


3 PHASE, LOW VOLTAGE, LOW $R_{DS(on)}$, MOSFET BRIDGE CIRCUIT IN A PLASTIC PACKAGE



Three Phase, 250 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 Milliohm Shunt Resistor
- Linear Thermal Sensor
- Isolated Low Profile Package
- Output Currents Up To 45 Amps

DESCRIPTION

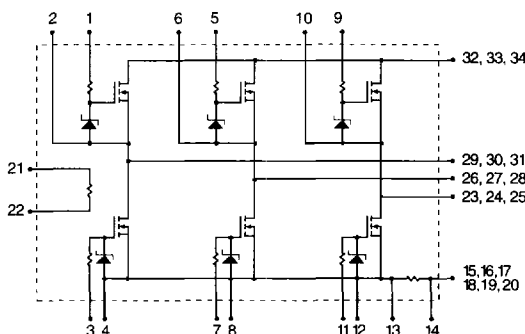
This series of MOSFET switches is configured in a 3 phase bridge with a common V_{DD} line, precision series shunt resistor in the source line, and a sensing element to monitor the substrate temperature. This device is ideally suited for Motor Control applications where size, performance, and efficiency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

2.1

MAXIMUM RATINGS (@ 25°C)

Part Number	V_{DS} (Volts)	$R_{DS(on)}$ (m Ω)	I_D (Amps)	Package
OMS425	250	0.110	15	MP-3
OMS525	250	0.110	20	MP-3
OMS625	250	0.055	45	MP-3

SCHEMATIC



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	OMS425	OMS525	OMS625	Units
V_{DS} Drain-Source Voltage	250	250	250	V
V_{DGR} Drain-Gate Voltage ($R_{GS} = 1\text{ m}\Omega$)	250	250	250	V
$I_D @ T_C = 25^\circ\text{C}$ Continuous Drain Current	15	20	45	A
$I_D @ T_C = 70^\circ\text{C}$ Continuous Drain Current	15	16.6	38	A
I_{DM} Pulsed Drain Current ¹	56	69	80	A
$P_D @ T_C = 25^\circ\text{C}$ Maximum Power Dissipation ²	50	50	100	W
$P_D @ T_C = 70^\circ\text{C}$ Maximum Power Dissipation ²	27.5	27.5	55	W
Junction-To-Case Linear Derating Factor	0.5	0.5	1.0	W/ $^\circ\text{C}$
Thermal Resistance Junction-To-Case	2.0	2.0	1.0	$^\circ\text{C}/\text{W}$

Note 1: Pulse Test: Pulse width ≤ 300 sec. Duty Cycle $\leq 1.5\%$.**Note 2:** Maximum Junction Temperature equal to 125°C .**ELECTRICAL CHARACTERISTICS: OMS425** ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	V_{BROSS}	250	-	-	V
Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$	I_{GSS}	-	-	10	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_C = 70^\circ\text{C}$		-	-	100	μA
Gate-Body Leakage, $V_{GS} = \pm 12\text{ V}$	I_{GSS}	-	-	± 500	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	$V_{GS(th)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, $V_{GS} = 10\text{ Vdc}$, $I_D = 9.0\text{ A}$	$R_{DS(on)}$	-	-	0.11	Ω
$T_C = 70^\circ\text{C}$		-	-	0.19	Ω
On State Drain Current, $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $V_{GS} = 10$	$I_{D(on)}$	15	-	-	A

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $I_D = 11.5\text{ A}$, $V_{DS} = 25\text{ V}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$	g_{fs}	11	-	-	mho
Input Capacitance		C_{iss}	-	-	4340	pF
Output Capacitance		C_{oss}	-	-	810	pF
Reverse Transfer Capacitance		C_{rss}	-	-	320	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DD} = 125\text{ V}$, $I_D = 15\text{ A}$, $R_{GS} = 9.1\text{ }\Omega$, $V_{GS} = 10\text{ V}$	t_{don}	-	-	50	ns
Rise Time		t_r	-	-	240	ns
Turn-Off Delay Time		t_{doff}	-	-	150	ns
Fall Time		t_f	-	-	182	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Source - Drain Current	$I_{SD} = 15\text{ A}$, $V_{GS} = 0$, $I_{SD} = 15\text{ A}$, $dv/dt = 100\text{ A}/\mu\text{Sec}$	I_{SD}	-	-	15	A
Source - Drain Current Pulsed		I_{SDM}^*	-	-	56	A
Forward On-Voltage		V_{SD}	-	-	1.3	V
Reverse Recovery Time		t_r	-	300	-	ns
Reverse Recovered Charge		Q_{rr}	-	3.5	-	μC

RESISTOR CHARACTERISTICS

Resistor Tolerance	R_S	9.0	10	11	m Ω
Temperature Coefficient, -40°C to $+70^\circ\text{C}$	T_{cr}	-	100	-	ppm

* Indicates Pulse Test $\leq 300\text{ }\mu\text{sec}$, Duty Cycle $\leq 1.5\%$

ELECTRICAL CHARACTERISTICS: OMS525 ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
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OFF CHARACTERISTICS

Drain-Source Breakdown Voltage, $I_D = 250 \mu A$, $V_{GS} = 0$	V_{BPDSS}	250	-	-	V
Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$	I_{DSS}	-	-	1.0	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_C = 70^\circ C$		-	-	100	μA
Gate-Body Leakage, $V_{GS} = \pm 12 V$	I_{GSS}	-	-	± 500	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{DS} = V_{GS}$, $I_D = 250 \mu A$	$V_{GS(TH)}$	2.0	-	4.0	V
Static Drain-Source On-Resistance, $V_{GS} = 10 Vdc$, $I_D = 10 A$	$R_{DS(on)}$	-	-	0.11	Ω
$T_C = 70^\circ C$		-	-	0.19	Ω
On State Drain Current, $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $V_{GS} = 10$	$I_{D(on)}$	20	-	-	A

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $I_D = 11.5 A$ $V_{GS} = 25 V$, $V_{GS} = 0$, $f = 1.0 \text{ MHz}$	g_{fs}	11	-	-	mho
Input Capacitance		C_{iss}	-	-	4340	pF
Output Capacitance		C_{oss}	-	-	810	pF
Reverse Transfer Capacitance		C_{rss}	-	-	320	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time,	$V_{DD} = 125 V$, $I_D = 20 A$, $R_{GS} = 9.1 \Omega$, $V_{GS} = 10 V$	$t_{d(on)}$	-	-	50	ns
Rise Time		t_r	-	-	250	ns
Turn-Off Delay Time		$t_{d(off)}$	-	-	180	ns
Fall Time		t_f	-	-	200	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Source - Drain Current	$I_{SD} = 20 A$, $V_{GS} = 0$, $I_{SD} = 20 A$, $di/dt = 100 A/\mu Sec$	I_{SD}	-	-	20	A
Source - Drain Current (Pulsed)		I_{SDM}^*	-	-	100	A
Forward On-Voltage		V_{SD}	-	-	1.3	V
Reverse Recovery Time		t_r	-	300	-	ns
Reverse Recovered Charge		Q_{rr}	-	3.5	-	μC

RESISTOR CHARACTERISTICS

Resistor Tolerance	R_S	9.0	10	11	m Ω
Temperature Coefficient, $-40^\circ C$ to $+70^\circ C$	T_{σ}	-	100	-	ppm

* Indicates Pulse Test $\leq 300 \mu sec$, Duty Cycle $\leq 1.5\%$.

ELECTRICAL CHARACTERISTICS: OMS625 (T_C = 25° unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
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OFF CHARACTERISTICS

Drain-Source Breakdown Voltage, I _D = 250 μA, V _{GS} = 0	V _{BRDSS}	250	-	-	V
Zero Gate Voltage Drain Current = V _{GS} , V _{DS} = Max. Rat.	I _{DSS}	-	-	10.5	μA
V _{DS} = Max. Rat. x 0.8, T _C = 70°C		-	-	1000	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)}	-	-	0.055	Ω
T _C = 70°C		-	-	0.1	Ω
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}	22	-	-	mho
Input Capacitance	V _{DS} = 25 V,	C _{iss}	-	-	8680	pF
Output Capacitance	V _{GS} = 0,	C _{oss}	-	-	1620	pF
Reverse Transfer Capacitance	f = 1.0 mHz	C _{res}	-	-	640	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	V _{DD} = 125 V, I _D = 45 A, R _{DS} = 9.1 Ω, V _{GS} = 10 V	t _{d(on)}	-	-	50	ns
Rise Time		t _r	-	-	250	ns
Turn-Off Delay Time		t _{d(off)}	-	-	160	ns
Fall Time		t _f	-	-	200	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Source - Drain Current	I _{SD} = 45 A, V _{GS} = 0, I _{SD} = 45 A, di/dt = 100 A/μSec	I _{SD}	-	-	45	A
Source - Drain Current (Pulsed)		I _{SDM} *	-	-	150	A
Forward On-Voltage		V _{SD}	-	-	1.3	V
Reverse Recovery Time		t _r	-	300	-	ns
Reverse Recovered Charge		Q _{rr}	-	7.0	-	μC

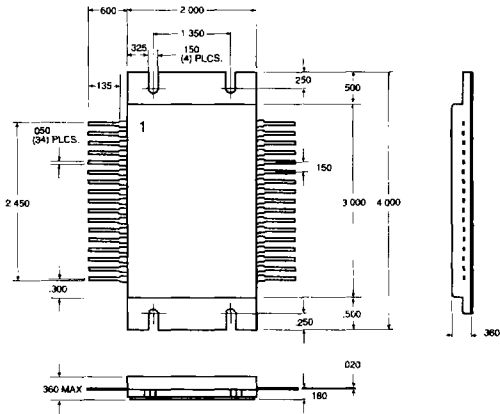
RESISTOR CHARACTERISTICS

Resistor Tolerance	R _S	9.0	10	11	mΩ
Temperature Coefficient, -40°C to +70°C	T _σ	-	100	-	ppm

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

2.1

Mechanical Outline



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|---------------------|-------------------------|
| 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 100μm maximum).