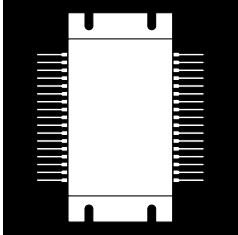


3 PHASE, LOW VOLTAGE, LOW $R_{DS(on)}$, MOSFET BRIDGE CIRCUIT IN A PLASTIC PACKAGE



Three Phase, 50 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

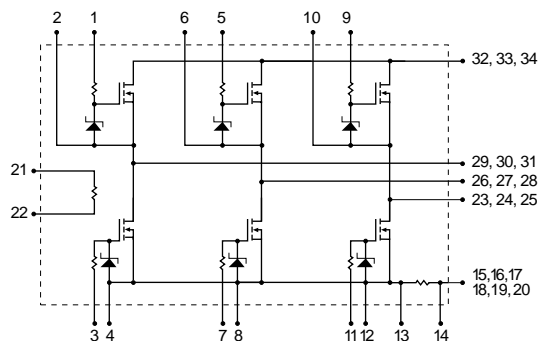
This series of MOSFET switches is configured in a 3 phase bridge with a common V_{DD} line, precision series shunt resistor in the source line, and a sensing element to monitor the substrate temperature. This device is ideally suited for Motor Control applications where size, performance, and efficiency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

2.1

MAXIMUM RATINGS (@ 25°C)

Part Number	V_{DS} (Volts)	$R_{DS(on)}$ (m Ω)	I_D (Amps)	Package
OMS305	50	100	15	MP-3
OMS305A	50	70	20	MP-3
OMS405	50	14	45	MP-3

SCHEMATIC



OMS305, OMS305A, OMS405

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

Parameter		OMS305	OMS305A	OMS405	Units
V_{DS}	Drain-Source Voltage	50	50	50	V
V_{DGR}	Drain-Gate Voltage ($R_{GS} = 1\text{ m}$)	50	50	50	V
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current	15	25	45	A
$I_D @ T_C = 70^\circ\text{C}$	Continuous Drain Current	11	16	45	A
I_{DM}	Pulsed Drain Current ¹	56	100	140	A
$P_D @ T_C = 25^\circ\text{C}$	Maximum Power Dissipation ²	20	50	50	W
$P_D @ T_C = 70^\circ\text{C}$	Maximum Power Dissipation ²	11	18	27	W
Junction-To-Case Linear Derating Factor		0.2	0.33	0.5	W/°C
Thermal Resistance Junction-To-Case		5.0	3.0	2.0	°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: OMS305 ($T_C = 25^\circ$ unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage, $I_D = 250\ \mu\text{A}$, $V_{GS} = 0$	V_{BRDSS}	50	-	-	V
Zero Gate Voltage Drain Current = V_{GS} , $V_{DS} = \text{Max. Rat.}$	I_{DSS}	-	-	25.0	μA
$V_{DS} = \text{Max. Rat.} \times 0.8$, $T_C = 70^\circ\text{C}$		-	-	500.0	μA
Gate-Body Leakage, $V_{GS} = \pm 12\text{ V}$	I_{GSS}	-	-	± 500	nA

ON CHARACTERISTICS

Gate-Threshold Voltage, $V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	V_{GSth}	2.0	-	4.0	V
Static Drain-Source On-Resistance, $V_{GS} = 10\text{ Vdc}$, $I_D = 9.0\text{ A}$	$R_{DS(on)}$	-	-	0.1	
$T_C = 70^\circ\text{C}$		-	-	0.2	
On State Drain Current, $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $V_{GS} = 10$	I_{Don}	15	-	-	A

DYNAMIC CHARACTERISTICS

Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max., $I_D = 9.0\text{ A}$ $V_{DS} = 25\text{ V}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$	g_{fs}	3.0	-	-	mho
Input Capacitance		C_{iss}	-	-	650	pF
Output Capacitance		C_{oss}	-	-	450	pF
Reverse Transfer Capacitance		C_{rss}	-	-	280	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DD} = 30\text{ V}$, $I_D = 3\text{ A}$, $R_{GS} = 50$, $V_{GS} = 10\text{ V}$	t_{don}	-	-	30	ns
Rise Time		t_r	-	-	85	ns
Turn-Off Delay Time		t_{doff}	-	-	90	ns
Fall Time		t_f	-	-	110	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Source - Drain Current	$I_{SD} = 28\text{ A}$, $V_{GS} = 0$ $I_{SD} = 13\text{ A}$, $di/dt = 100\text{ A}/\mu\text{Sec}$	I_{SD}	-	-	14	A
Source - Drain Current Pulsed		I_{SDM}^*	-	-	56	A
Forward On-Voltage		V_{SD}	-	-	1.8	V
Reverse Recovery Time		t_{rr}	-	120	-	ns
Reverse Recovered Charge		Q_{rr}	-	0.15	-	μC

RESISTOR CHARACTERISTICS

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

* Indicates Pulse Test 300 μsec , Duty Cycle 1.5%

2.1

OMS305, OMS305A, OMS405

ELECTRICAL CHARACTERISTICS: OMS305A (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}	50	-	-	V
Zero Gate Voltage Drain Current = V _{GS} , V _{DS} = Max. Rat. V _{DS} = Max. Rat. x 0.8, T _C = 70°C	I _{DSS}	-	-	250	μA
		-	-	750	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 T _C = 70°C	R _{DS(on)}	-	-	0.07	
		-	-	0.14	
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, V _{DS} = 25 V, V _{GS} = 0, f = 1.0 MHz	g _{fs}	5.0	-	-	mho
Input Capacitance		C _{iss}	-	1020	-	pF
Output Capacitance		C _{oss}	-	500	-	pF
Reverse Transfer Capacitance		C _{rss}	-	120	-	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	V _{DS} = 30 V, I _D = 10 A, R _{GS} = 4.7 Ω, V _{GS} = 10 V, R _L = 2.4 Ω	t _{d(on)}	-	-	50	ns
Rise Time		t _r	-	-	75	ns
Turn-Off Delay Time		t _{d(off)}	-	-	50	ns
Fall Time		t _f	-	-	50	ns

SOURCE DRAIN DIODE CHARACTERISTICS

Source - Drain Current	I _{SD} = 28 A, V _{GS} = 0, I _{SD} = 13 A, di/dt = 100 A/μSec	I _{SD}	-	-	25	A
Source - Drain Current (Pulsed)		I _{SDM} *	-	-	100	A
Forward On-Voltage		V _{SD}	-	-	2.4	V
Reverse Recovery Time		t _{rr}	-	100	-	ns
Reverse Recovered Charge		Q _r	-	0.15	-	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%.

2.1

OMS305, OMS305A, OMS405

ELECTRICAL CHARACTERISTICS: OMS405 (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}	50	-	-	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}	-	-	±100	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)}	-	-	0.016	
T _C = 70°C		-	-	0.028	
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}	-	-	5200	pF
Output Capacitance	V _{GS} = 0,	C _{oss}	-	-	2300	pF
Reverse Transfer Capacitance	f = 1.0 MHz	C _{rss}	-	-	600	pF

SWITCHING CHARACTERISTICS

Turn-On Delay Time	V _{DD} = 30 V, I _D = 45 A, I _D = 10 A, R _{GS} = 50 Ω, V _{GS} = 10 V	t _{di(on)}	-	-	260	ns
Rise Time		t _r	-	-	1200	ns
Turn-Off Delay Time		t _{di(off)}	-	-	550	ns
Fall Time		t _f	-	-	420	ns

SOURCE DRAIN DIODE CHARACTERISTICS

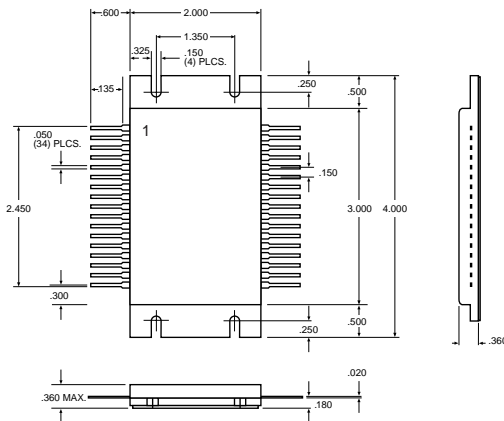
Source - Drain Current	I _{SD} = 45 A, V _{GS} = 0, I _{SD} = 45 A, di/dt = 100 A/μSec	I _{SD}	-	-	45	A
Source - Drain Current (Pulsed)		I _{SDM} *	-	-	150	A
Forward On-Voltage		V _{SD}	-	-	1.5	V
Reverse Recovery Time		t _{rr}	-	120	-	ns
Reverse Recovered Charge		Q _{rr}	-	0.45	-	μC

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

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 100um maximum).