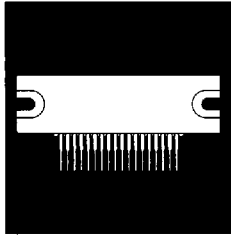


THREE PHASE MOSFET HALF BRIDGE IN A PLASTIC SIP PACKAGE



100V Thru 500V, Up to 6 Amp, Three Phase
MOSFET Half Bridge

FEATURES

- Isolated High Density, Low Profile Package
- 6 MOSFETs Per Package
- Fast Switching, Low Drive Current
- Heat Sinkable
- Low $R_{DS(on)}$
- P-Channel Also Available

DESCRIPTION

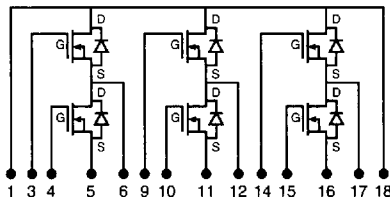
This series of three phase MOSFET half bridge products feature the latest advanced MOSFET and packaging technology. They are ideally suited where small size, high performance and high reliability are required in applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high energy pulse circuits.

MAXIMUM RATINGS (Per MOSFET)

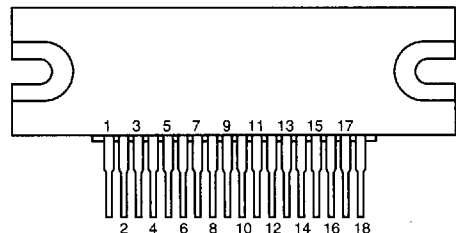
PART NUMBER	V_{DS}	$R_{DS(on)}$	$I_{D(MAX)}$
OM6413SP3	100V	.085 Ω	6A
OM6414SP3	200V	.180 Ω	4A
OM6415SP3	400V	.55 Ω	2.5A
OM6416SP3	500V	.85 Ω	2A

2.1

SCHEMATIC



PIN CONNECTION



- | | | | | |
|-----------------|---------------------|----------------------|----------------|----------------------|
| Pin 1: V_{CC} | Pin 5: Source | Pin 9: Gate | Pin 13: N/C | Pin 17: Drain/Source |
| Pin 2: N/C | Pin 6: Drain/Source | Pin 10: Gate | Pin 14: Gate | Pin 18: V_{CC} |
| Pin 3: Gate | Pin 7: N/C | Pin 11: Source | Pin 15: Gate | |
| Pin 4: Gate | Pin 8: N/C | Pin 12: Drain/Source | Pin 16: Source | |

Note: Pin 1 and Pin 18 are common

**ELECTRICAL CHARACTERISTICS: $T_C = 25^\circ$ unless otherwise noted
STATIC P/N OM6413SP3**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain-Source Breakdown Voltage	100			V	$V_{GS} = 0$, $I_D = 250 \mu A$
$V_{GS(th)}$ Gate-Threshold Voltage	2.0	4.0	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250 \mu A$
I_{DSSF} Gate-Body Leakage Forward		100	100	nA	$V_{GS} = 20 V$
I_{DSSR} Gate-Body Leakage Reverse		-100	-100	nA	$V_{GS} = -20 V$
I_{DSS} Zero Gate Voltage Drain Current	0.1 0.2	0.25 1.0	0.25 1.0	mA	$V_{DS} = \text{Max. Rat.}$, $V_{GS} = 0$, $V_{GS} = 0.8 \text{ Max. Rat.}$, $V_{GS} = 0$, $T_C = 100^\circ C$
$I_{D(on)}$ On-State Drain Current ¹	6			A	$V_{DS} \geq 2 V_{DSS(on)}$, $V_{GS} = 10 V$
$V_{DS(on)}$ Static Drain-Source On-State Voltage ¹	1.275	1.425		V	$V_{GS} = 10 V$, $I_D = 6 A$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ¹	.085	.095		Ω	$V_{GS} = 10 V$, $I_D = 6 A$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ¹	.130	.155		Ω	$V_{GS} = 10 V$, $I_D = 6 A$, $T_C = 100^\circ C$

DYNAMIC

g_{fs} Forward Transconductance ¹	6.0	7.2		S	$V_{DS} \geq 2 V_{DSS(on)}$, $I_D = 6 A$
C_{iss} Input Capacitance		1275	1600	pF	$V_{GS} = 0$
C_{oss} Output Capacitance		550	800	pF	$V_{DS} = 25 V$
C_{res} Reverse Transfer Capacitance		160	300	pF	$f = 1 \text{ MHz}$
$T_{d(on)}$ Turn-On Delay Time		16	30	ns	$V_{DS} = 30 V$, $I_D = 15 A$
t_r Rise Time		19	60	ns	$R_\theta = 5 \Omega$, $R_L = 2 \Omega$
$T_{d(off)}$ Turn-Off Delay Time		42	80	ns	(MOSFET) switching times are essentially independent of operating temperature.
t_f Fall Time		24	30	ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S Continuous Source Current (Body Diode)			-6	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM} Source Current ¹ (Body Diode)			-20	A	
V_{SD} Diode Forward Voltage ¹			-2.5	V	$T_C = 25^\circ C$, $I_S = -12 A$, $V_{GS} = 0$
t_r Reverse Recovery Time		400		ns	$T_J = 150^\circ C$, $I_R = I_S$, $dI/dt = 100 A/\mu s$

1 Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

**ELECTRICAL CHARACTERISTICS: $T_C = 25^\circ$ unless otherwise noted
STATIC P/N OM6414SP3**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain-Source Breakdown Voltage	200			V	$V_{GS} = 0$, $I_D = 250 \mu A$
$V_{GS(th)}$ Gate-Threshold Voltage	2.0	4.0	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250 \mu A$
I_{DSSF} Gate-Body Leakage Forward		100	100	nA	$V_{GS} = 20 V$
I_{DSSR} Gate-Body Leakage Reverse		-100	-100	nA	$V_{GS} = -20 V$
I_{DSS} Zero Gate Voltage Drain Current	0.1 0.2	0.25 1.0	0.25 1.0	mA	$V_{DS} = \text{Max. Rat.}$, $V_{GS} = 0$, $V_{GS} = 0.8 \text{ Max. Rat.}$, $V_{GS} = 0$, $T_C = 100^\circ C$
$I_{D(on)}$ On-State Drain Current ¹	4		1.4	A	$V_{DS} \geq 2 V_{DSS(on)}$, $V_{GS} = 10 V$
$V_{DS(on)}$ Static Drain-Source On-State Voltage ¹		0.14	0.18	Ω	$V_{GS} = 10 V$, $I_D = 4 A$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ¹		0.28	0.36	Ω	$V_{GS} = 10 V$, $I_D = 4 A$, $T_C = 100^\circ C$

DYNAMIC

g_{fs} Forward Transconductance ¹	6.0	9.0		S	$V_{DS} \geq 2 V_{DSS(on)}$, $I_D = 4 A$
C_{iss} Input Capacitance		1000	1600	pF	$V_{GS} = 0$
C_{oss} Output Capacitance		250	750	pF	$V_{DS} = 25 V$
C_{res} Reverse Transfer Capacitance		100	300	pF	$f = 1 \text{ MHz}$
$T_{d(on)}$ Turn-On Delay Time		17	30	ns	$V_{DS} = 75 V$, $I_D = 10 A$
t_r Rise Time		52	60	ns	$R_\theta = 5 \Omega$, $R_L = 7.3 \Omega$
$T_{d(off)}$ Turn-Off Delay Time		36	80	ns	(MOSFET) switching times are essentially independent of operating temperature.
t_f Fall Time		30	60	ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S Continuous Source Current (Body Diode)			-4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I_{SM} Source Current ¹ (Body Diode)			-25	A	
V_{SD} Diode Forward Voltage ¹			-2	V	$T_C = 25^\circ C$, $I_S = -9 A$, $V_{GS} = 0$
t_r Reverse Recovery Time		350		ns	$T_J = 150^\circ C$, $I_R = I_S$, $dI/dt = 100 A/\mu s$

1 Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

**ELECTRICAL CHARACTERISTICS: T_c = 25° unless otherwise noted
STATIC P/N OM6415SP3**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DS}	400			V	V _{GS} = 0, I _b = 250 μA
V _{GS(th)}	2.0	4.0	4.0	V	V _{DS} = V _{GS} , I _b = 250 μA
I _{SSF}			100	nA	V _{GS} = 20 V
I _{SSR}			-100	nA	V _{GS} = -20 V
I _{SS}	0.1	0.25	0.25	mA	V _{DS} = Max. Rat., V _{GS} = 0
	0.2	1.0	1.0	mA	V _{DS} = 0.8 Max. Rat., V _{GS} = 0, T _c = 100° C
I _{ON}	2.5			A	V _{DS} ≥ 2 V _{GS(on)} , V _{GS} = 10 V
V _{DS(on)}	2.35	2.75		V	V _{GS} = 10 V, I _b = 2.5 A
R _{DS(on)}	0.47	0.55		Ω	V _{GS} = 10 V, I _b = 2.5 A
R _{DS(on)}	0.93	1.10		Ω	V _{GS} = 10 V, I _b = 2.5 A, T _c = 100° C

DYNAMIC

g _k	4.0	4.4		S	V _{DS} ≥ 2 V _{GS(on)} , I _b = 2.5 A
C _{iss}	1150	1600		pF	V _{GS} = 0
C _{oss}	165	450		pF	V _{DS} = 25 V
C _{iss}	70	150		pF	f = 1 MHz
T _{turn-on}	17	35		ns	V _{DD} = 175 V, I _b = 5 A
t _r	12	15		ns	R _θ = 5 Ω, R _L = 35 Ω
T _{turn-off}	45	90		ns	(MOSFET) switching times are essentially independent of operating temperature.
t _f	30	35		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I _S			-2.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM}			-10	A	
V _{SB}			-2	V	T _c = 25°C, I _S = -5 A, V _{GS} = 0
t _r	400			ns	T _J = 150°C, I _r = I _S , dI _F /ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300μsec, Duty Cycle ≤ 2%.

**ELECTRICAL CHARACTERISTICS: T_c = 25° unless otherwise noted
STATIC P/N OM6416SP3**

Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV _{DS}	500			V	V _{GS} = 0, I _b = 250 μA
V _{GS(th)}	2.0	4.0	4.0	V	V _{DS} = V _{GS} , I _b = 250 μA
I _{SSF}			100	nA	V _{GS} = 20 V
I _{SSR}			-100	nA	V _{GS} = -20 V
I _{SS}	0.1	0.25	0.25	mA	V _{DS} = Max. Rat., V _{GS} = 0
	0.2	1.0	1.0	mA	V _{DS} = 0.8 Max. Rat., V _{GS} = 0, T _c = 100° C
I _{ON}	2.0			A	V _{DS} ≥ 2 V _{GS(on)} , V _{GS} = 10 V
V _{DS(on)}	3.2	3.4		V	V _{GS} = 10 V, I _b = 2 A
R _{DS(on)}	0.8	0.85		Ω	V _{GS} = 10 V, I _b = 2 A
R _{DS(on)}	1.50	1.65		Ω	V _{GS} = 10 V, I _b = 2 A, T _c = 100° C

DYNAMIC

g _k	4.0	4.8		S	V _{DS} ≥ 2 V _{GS(on)} , I _b = 2 A
C _{iss}	1225	1600		pF	V _{GS} = 0
C _{oss}	200	350		pF	V _{DS} = 25 V
C _{iss}	85	150		pF	f = 1 MHz
T _{turn-on}	17	35		ns	V _{DD} = 200 V, I _b = 4 A
t _r	5	15		ns	R _θ = 5 Ω, R _L = 49 Ω
T _{turn-off}	42	90		ns	(MOSFET) switching times are essentially independent of operating temperature.
t _f	14	30		ns	

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I _S			-2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier.
I _{SM}			-8	A	
V _{SB}			-2	V	T _c = 25°C, I _S = -9 A, V _{GS} = 0
t _r	400			ns	T _J = 150°C, I _r = I _S , dI _F /ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300μsec, Duty Cycle ≤ 2%.

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

Parameter	OM6413	OM6414	OM6415	OM6416	Units
V_{DS} Drain-Source Voltage	100	200	400	500	V
V_{DGR} Drain-Gate Voltage ($R_{GS} = 1\text{ M}\Omega$)	100	200	400	500	V
$I_D @ T_C = 25^\circ\text{C}$ Continuous Drain Current	± 6	± 4	± 2.5	± 2	A
I_{DM} Pulsed Drain Current ¹	± 30	± 25	± 20	± 15	A
V_{GS} Gate-Source Voltage	± 20	± 20	± 20	± 20	V
$P_D @ T_C = 25^\circ\text{C}$ Maximum Power Dissipation	50	50	50	50	W
Junction To Case Linear Derating Factor	0.5	0.5	0.5	0.5	W/ $^\circ\text{C}$
Junction To Ambient Linear Derating Factor	.020	.020	.020	.020	W/ $^\circ\text{C}$
T_J Operating and T_{stg} Storage Temperature Range	-55 to 125	-55 to 125	-55 to 125	-55 to 125	$^\circ\text{C}$
Lead Temperature (1/16" from case for 5 secs.)	225	225	225	225	$^\circ\text{C}$

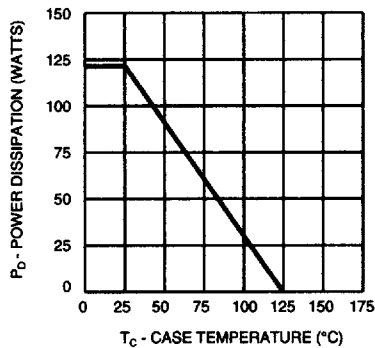
- 1 Pulse Test: Pulse width $\leq 300\ \mu\text{sec}$. Duty Cycle $\leq 2\%$.
- 2 Pan Head Screw, Non-Lubricated Threads

THERMAL RESISTANCE

R_{thJC} Junction-to-Case	2.00	$^\circ\text{C}/\text{W}$	
R_{thJA} Junction-to-Ambient	50	$^\circ\text{C}/\text{W}$	Free Air Operation
Mounting Torque	3.0	LBF \cdot IN	

2.1

POWER RATING



MECHANICAL OUTLINE

