

P-Channel 20V (D-S)MOSFET With Schottky Diode

General Description

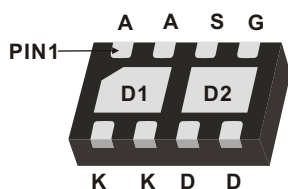
These miniature surface mount MOSFET uses advance Trench process, low $R_{DS(on)}$ assures minimal power loss and converts energy. Making this device idea for use in power management circuit.

Applications

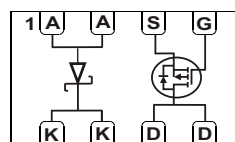
- Li-Ion Battery Charging
- High Side DC-DC Conversion Circuits
- High Side Drive for Small Brushless DC Motors
- Power Management in Portable, Battery Powered Products

Features

- MOSFET**
- $V_{DS} (V) = -20V$
 - $I_D (A) = -3.0A$ ($V_{GS} = -4.5V$)
 - $R_{DS(on)} = 0.110 \text{ ohm}$ @ $V_{GS} = -4.5V$
 - $R_{DS(on)} = 0.120 \text{ ohm}$ @ $V_{GS} = -2.5V$
- Schottky Diode**
- $V_{KA} (V) = 20V$
 - $I_F (A) = 1.0A$
 - $V_F = 0.42 V$ @ $0.5A$



MDFN 2×3×0.75(mm) SlimFET™



Schottky P-channel Diode Mosfet

ABSOLUTE MAXIMUM RATINGS (TA = 25°C UNLESS OTHERWISE NOTED)

Parameter		Steady State	Unit
Drain-Source Voltage (MOSFET and Schottky)		-20	V
Reverse Voltage (Schottky)		20	
Gate-Source Voltage (MOSFET)		±8	
Continuous Drain Current (T _J =150C)(MOSFET) ^a	TA=25°C	-3.0	A
	TA=70°C	-2.4	
Pulsed Drain Current (MOSFET)		-12	
Continuous Source Current (MOSFET Diode Conduction) ^a		-1.25	
Average Foward Current (Schottky) ^a		1.0	
Pulsed Foward Current (Schottky) ^a		7.0	
Maximum Power Dissipation (MOSFET) ^a	TA=25°C	1.4	W
	TA=70°C	1.0	
Maximum Power Dissipation (Schottky) ^a	TA=25°C	0.96	
	TA=85°C	0.59	
Operating Junction and Storage Temperature Range		-55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{b,c}		260	

Notes

a. Surface Mounted on 1"x1" FR4 Board.

b. See Reliability Manual for profile. The SlimFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

Package Outlines and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
MF5 • 853	MF5853	7"	8mm	3000 units

THERMAL RESISTANCE RATINGS

Parameter	Device	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient ^a	MOSFET	R _{thJA}		100	C/W	
				Schottky		77
	Steady State		MOSFET			166
			Schottky	110		130
Junction-to-Foot	Steady State	R _{thJF}		40		
				Schottky	33	40

Notes

a. Surface Mounted on 1"x 1" FR4 Board.

MOSFET 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} =0V, I _D =-250μA	-20			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-0.45	-0.72	-1.0	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -20 V, V _{GS} = 0 V			-1.0	μA
		V _{DS} = -20 V, V _{GS} = 0 V, T _J = 55°C			-10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = -5 V, V _{GS} = -4.5 V	-12			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = -4.5 V, I _D = -3.0A	82	96	110	mΩ
		V _{GS} = -2.5 V, I _D = -2.4 A	88	102	120	
Forward Transconductance ^a	G _{FS}	V _{DS} = -5 V, I _D = -2.8 A		3		S
Diode Forward Voltage ^a	V _{SD}	I _S = -1.0 A, V _{GS} = 0 V			-1.0	V

Dynamic^b

Total Gate Charge	Q _g	V _{DS} = -10 V, V _{GS} = -4.5 V, I _D = -3.0 A		6.0		nC
Gate-Source Charge	Q _{gs}			0.8		
Gate-Drain Charge	Q _{gd}			1.3		
Turn-On Delay Time	t _{d(on)}	V _{DD} = -10 V, R _G = 6 ohm I _D = -1 A, V _{GEN} = -4.5 V		6.5	25	ns
Rise Time	t _r			20	60	
Turn-Off Delay Time	t _{d(off)}			31	70	
Fall Time	t _f			21	60	
Source-Drain Reverse Recovery Time	t _{rr}	I _F = -0.9 A, di/dt = 100 A/ s		20	40	

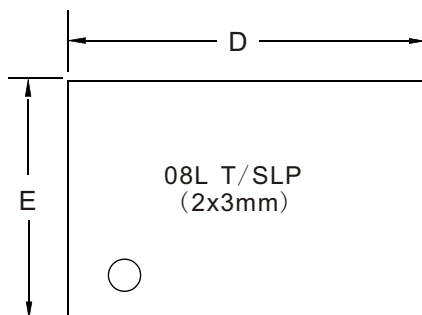
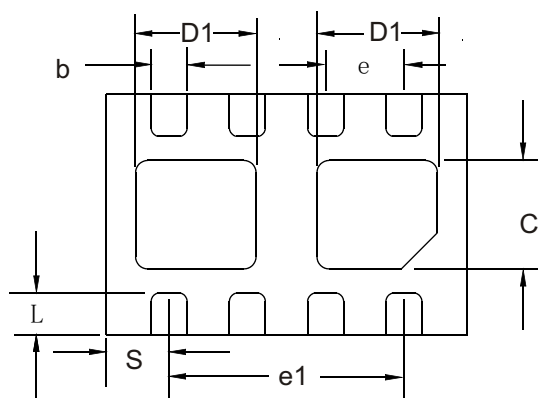
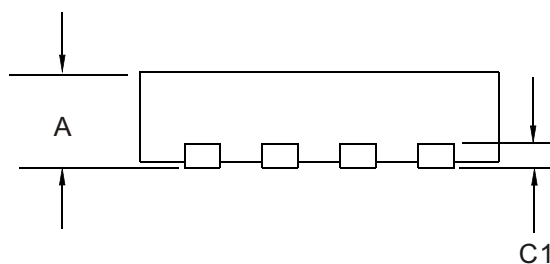
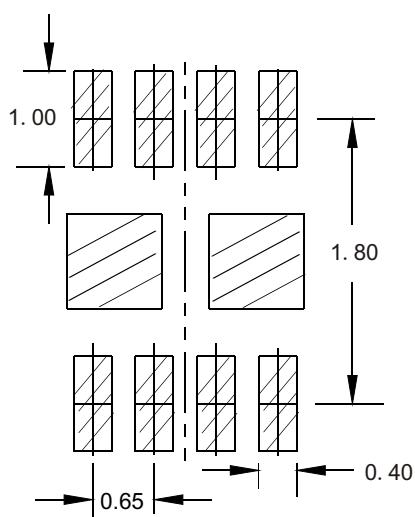
Notes

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.

b. Guaranteed by design, not subject to production testing.

SCHOTTKY SPECIFICATIONS (T_J=25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Forward Voltage Drop	V _F	I _F = 0.1 A			350	mV
		I _F = 0.5 A			420	
	V _{BR}	I _r = 0.25mA	20	25		V
Maximum Reverse Leakage Current	I _R	V _r = 10 V		8	75	μA
		V _r = 20 V		40	250	
Junction Capacitance	C _T	V _r = 10 V		31		pF

MDFN 2x3x0.75 (mm) Package**TOP VIEW****BOTTOM VIEW****SIDE VIEW****RECOMMENDED LAND PATTERN**

UNIT:mm

Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	1.00	—	1.10	0.039	—	0.043
b	0.25	0.30	0.35	0.010	0.012	0.014
C	0.85	0.90	0.95	0.034	0.036	0.038
C1	0.203 Ref			0.008 Ref		
D	2.95	3.05	3.10	0.116	0.120	0.122
D1	0.95	1.00	1.05	0.038	0.039	0.041
E	1.83	1.90	1.975	0.072	0.075	0.078
e	0.65 BSC			0.026 BSC		
e1	1.95 Ref			0.077 Ref		
L	0.28	—	0.42	0.011	—	0.017
S	0.55 BSC			0.022 BSC		