

# High Current Density Surface-Mount (TMBS®) Trench MOS Barrier Schottky Rectifier

Ultra Low  $V_F = 0.45\text{ V}$  at  $I_F = 5\text{ A}$



FlatPAK 5 x 6

1, 2, 3, 4  5, 6, 7, 8

## FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available  
- Automotive ordering code: base P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

AUTOMOTIVE  
GRADE  
Available



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## TYPICAL APPLICATIONS

For use in low voltage high frequency DC/DC converters, freewheeling diodes, and polarity protection applications.

## MECHANICAL DATA

**Case:** FlatPAK 5 x 6

Molding compound meets UL 94 V-0 flammability rating

Base P/N-M3 - halogen-free, RoHS-compliant

Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 and HM3 suffix meets JESD 201 class 2 whisker test

## LINKS TO ADDITIONAL RESOURCES



3D Models

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	20 A
$V_{RRM}$	120 V
$I_{FSM}$	220 A
$V_F$ at $I_F = 20\text{ A}$ ( $T_J = 125\text{ °C}$ )	0.64 V
$T_J$ max.	165 °C
Package	FlatPAK 5 x 6
Circuit configuration	Single

### MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)

PARAMETER	SYMBOL	V20KM120	UNIT
Device marking code		20M12	
Maximum repetitive peak reverse voltage	$V_{RRM}$	120	V
Maximum DC forward current	$I_{F(AV)}^{(1)}$	20	A
	$I_{F(AV)}^{(2)}$	4	
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	$I_{FSM}$	220	
Operating junction temperature range	$T_J^{(3)}$	-40 to +165	°C
Storage temperature range	$T_{STG}$	-55 to +165	

### Notes

(1) With infinite heatsink

(2) Free air, mounted on recommended pad area

(3) The heat generated must be less than the thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$

**ELECTRICAL CHARACTERISTICS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

PARAMETER	TEST CONDITIONS	SYMBOL	TYP.	MAX.	UNIT
Instantaneous forward voltage	$I_F = 5\text{ A}$	$V_F^{(1)}$	0.54	-	V
	$I_F = 10\text{ A}$		0.64	-	
	$I_F = 20\text{ A}$		0.81	0.87	
	$I_F = 5\text{ A}$		0.45	-	
	$I_F = 10\text{ A}$		0.54	-	
	$I_F = 20\text{ A}$		0.64	0.69	
Reverse current	$V_R = 90\text{ V}$	$I_R^{(2)}$	0.008	-	mA
			3.5	-	
	$V_R = 120\text{ V}$		-	0.5	
			6	30	
Typical junction capacitance	4.0 V, 1 MHz	$C_J$	1920	-	pF

**Notes**(1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle(2) Pulse test: pulse width  $\leq 5\text{ ms}$ **THERMAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Thermal resistance	$R_{\theta JA}^{(1)(2)}$	75	-	$^{\circ}\text{C/W}$
	$R_{\theta JM}^{(3)}$	2.5	3.5	

**Notes**(1) The heat generated must be less than thermal conductivity from junction to ambient:  $dP_D/dT_J < 1/R_{\theta JA}$ (2) Free air, mounted on recommended copper pad area; thermal resistance  $R_{\theta JA}$  - junction-to-ambient(3) Mounted on infinite heatsink; thermal resistance  $R_{\theta JM}$  - junction-to-mount**ORDERING INFORMATION** (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
V20KM120-M3/H	0.10	H	1500	7" diameter plastic tape and reel
V20KM120-M3/I	0.10	I	6000	13" diameter plastic tape and reel
V20KM120HM3/H <sup>(1)</sup>	0.10	H	1500	7" diameter plastic tape and reel
V20KM120HM3/I <sup>(1)</sup>	0.10	I	6000	13" diameter plastic tape and reel

**Note**

(1) AEC-Q101 qualified

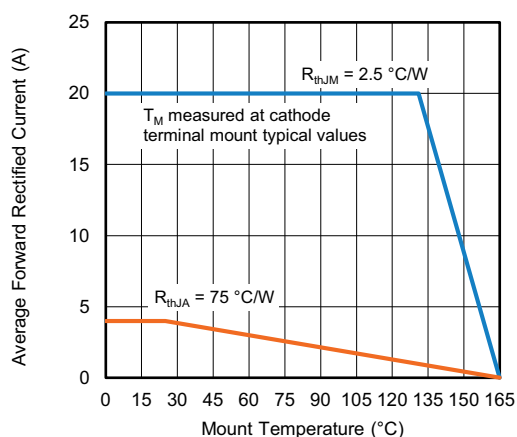
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

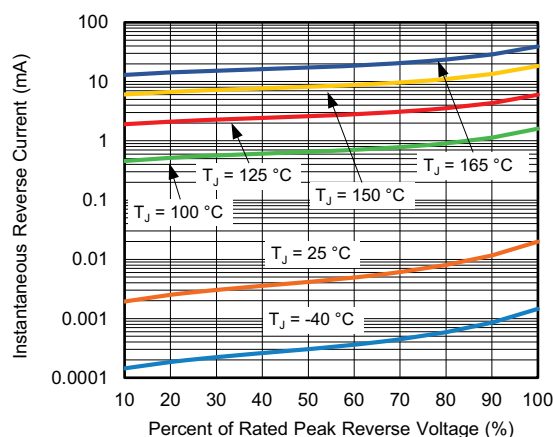


Fig. 4 - Typical Reverse Leakage Characteristics

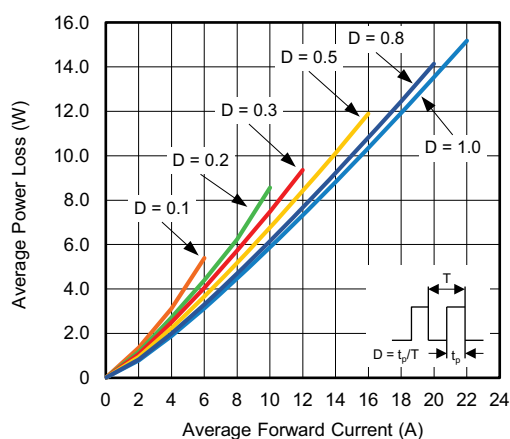


Fig. 2 - Forward Power Loss Characteristics

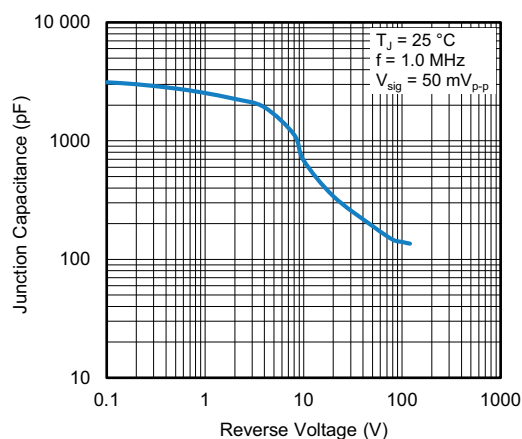


Fig. 5 - Typical Junction Capacitance

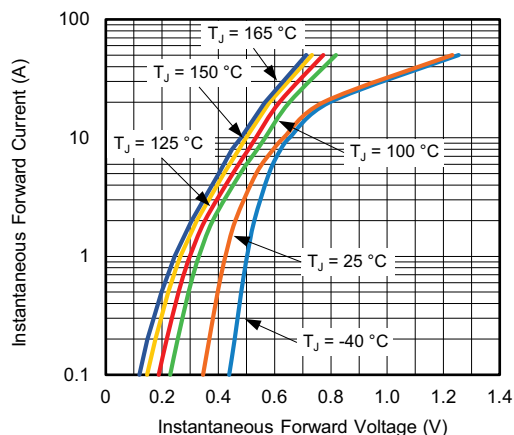


Fig. 3 - Typical Instantaneous Forward Characteristics

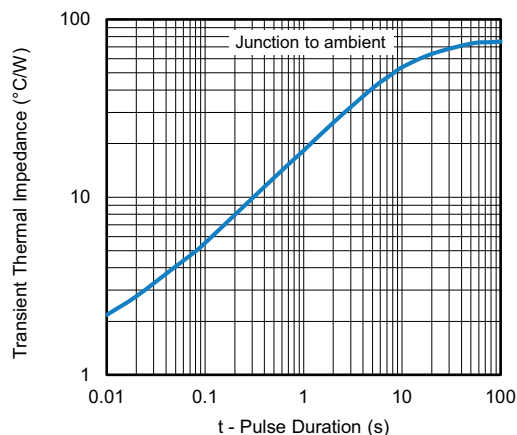
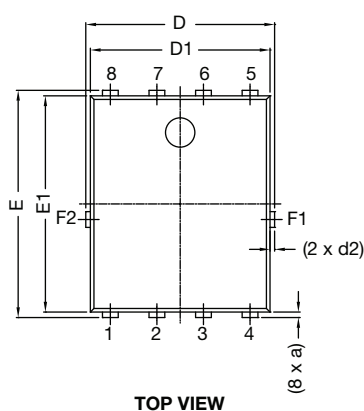
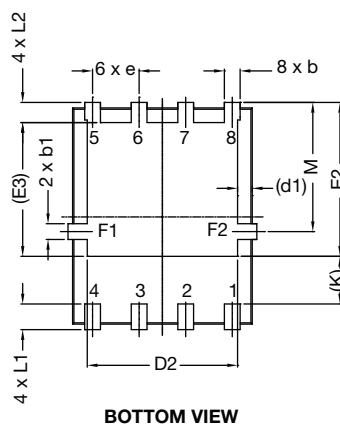
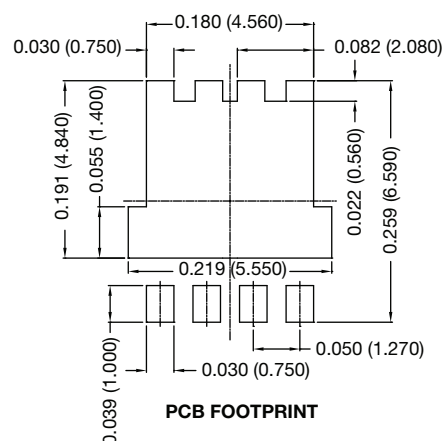
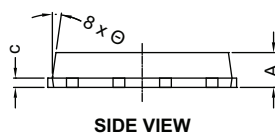


Fig. 6 - Typical Transient Thermal Impedance

**DIMENSIONS** in inches (millimeters)**FlatPAK 5 x 6****TOP VIEW****BOTTOM VIEW****PCB FOOTPRINT****SIDE VIEW**

DIM.	INCHES			MILLIMETERS		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.035	0.039	0.043	0.89	0.99	1.09
(a)	-	0.006	-	-	0.15	-
b	0.013	0.017	0.020	0.32	0.43	0.52
b1	0.013	0.017	0.020	0.32	0.43	0.52
c	0.008	-	0.014	0.20	-	0.35
D	0.197	0.203	0.209	5.00	5.15	5.30
D1	0.189	0.193	0.197	4.80	4.90	5.00
D2	0.154	0.161	0.169	3.90	4.10	4.30
(d1)	-	0.016	-	-	0.40	-
(d2)	-	0.005	-	-	0.125	-
E	0.238	0.244	0.250	6.05	6.20	6.35
E1	0.228	0.232	0.236	5.80	5.90	6.00
E2	0.157	0.165	0.173	4.00	4.20	4.40
(E3)	-	0.144	-	-	3.65	-
e	0.050 BSC			1.27 BSC		
(K)	0.039	-	-	1.00	-	-
L1	0.019	-	0.043	0.48	-	1.10
L2	0.012	-	0.031	0.30	-	0.80
M	0.128	0.138	0.148	3.25	3.50	3.75
Θ	0°	-	10°	0°	-	10°

**Notes**

- Dimensioning and tolerancing per ASME Y14.5-2009
- Dimensions D1 and E1 do not include mold flash or gate burrs
- Dimension (XX) means reference only



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