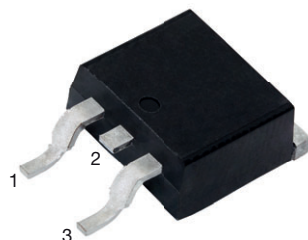
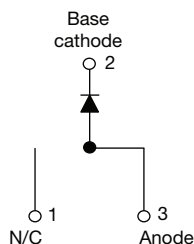


## High Performance Schottky Rectifier, 6 A


**D<sup>2</sup>PAK (TO-263AB)**


### FEATURES

- 175 °C T<sub>J</sub> operation
- High frequency operation
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

### PRIMARY CHARACTERISTICS

I <sub>F(AV)</sub>	6 A
V <sub>R</sub>	35 V, 40 V, 45 V
V <sub>F</sub> at I <sub>F</sub>	0.53 V
I <sub>RM</sub>	7 mA at 125 °C
T <sub>J</sub> max.	175 °C
E <sub>AS</sub>	8 mJ
Package	D <sup>2</sup> PAK (TO-263AB)
Circuit configuration	Single

### DESCRIPTION

The VS-6TQ... Schottky rectifier series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	6	A
V <sub>RRM</sub>	Range	35 to 45	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	690	A
V <sub>F</sub>	6 A <sub>pk</sub> , T <sub>J</sub> = 125 °C	0.53	V
T <sub>J</sub>	Range	-55 to +175	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-6TQ035S-M3	VS-6TQ040S-M3	VS-6TQ045S-M3	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	35	40	45	V
Maximum working peak reverse voltage	V <sub>RWM</sub>				

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 164 °C, rectangular waveform	6	A
Maximum peak one cycle non-repetitive surge current See fig. 7	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	690	
		10 ms sine or 6 ms rect. pulse	140	
Non-repetitive avalanche energy	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 1.20 A, L = 11.10 mH	8	mJ
Repetitive avalanche current	I <sub>AR</sub>	Current decaying linearly to zero in 1 μs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical	1.20	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	6 A	0.60	V
		12 A	0.73	
		6 A	0.53	
		12 A	0.64	
Maximum reverse leakage current See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	0.8	mA
		$T_J = 125\text{ }^{\circ}\text{C}$	7	
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$	0.35	V
Forward slope resistance	$r_t$		18.23	m $\Omega$
Maximum junction capacitance	$C_T$	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$	400	pF
Typical series inductance	$L_S$	Measured lead to lead 5 mm from package body	8.0	nH
Maximum voltage rate of change	$dV/dt$	Rated $V_R$	10 000	V/ $\mu$ s

**Note**(1) Pulse width < 300  $\mu$ s, duty cycle < 2 %**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-55 to 175	$^{\circ}\text{C}$
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation See fig. 4	2.2	$^{\circ}\text{C/W}$
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth, and greased	0.50	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style D <sup>2</sup> PAK (TO-263AB)	6TQ035S	
			6TQ040S	
			6TQ045S	

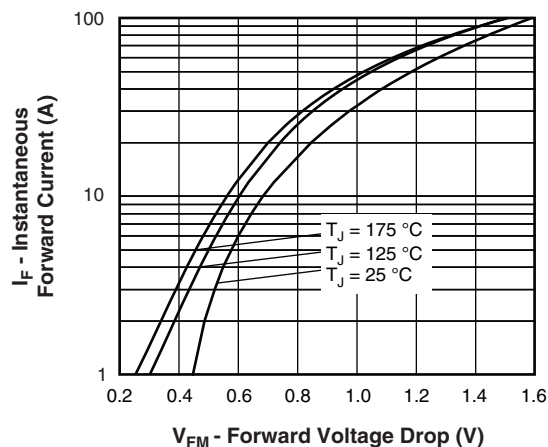


Fig. 1 - Maximum Forward Voltage Drop Characteristics

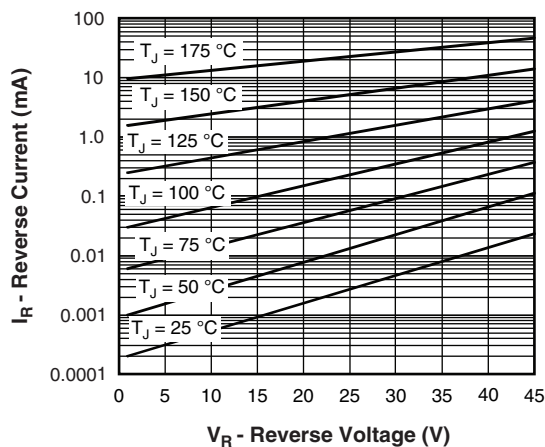


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

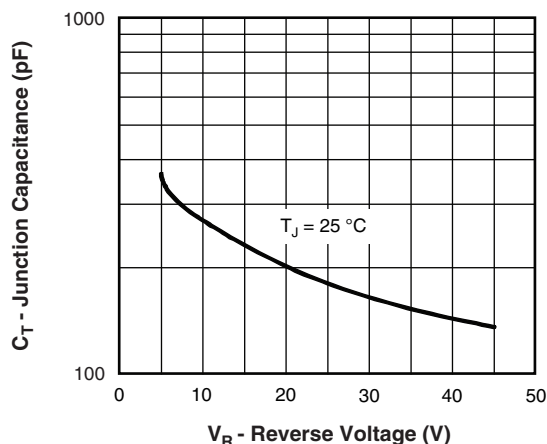


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

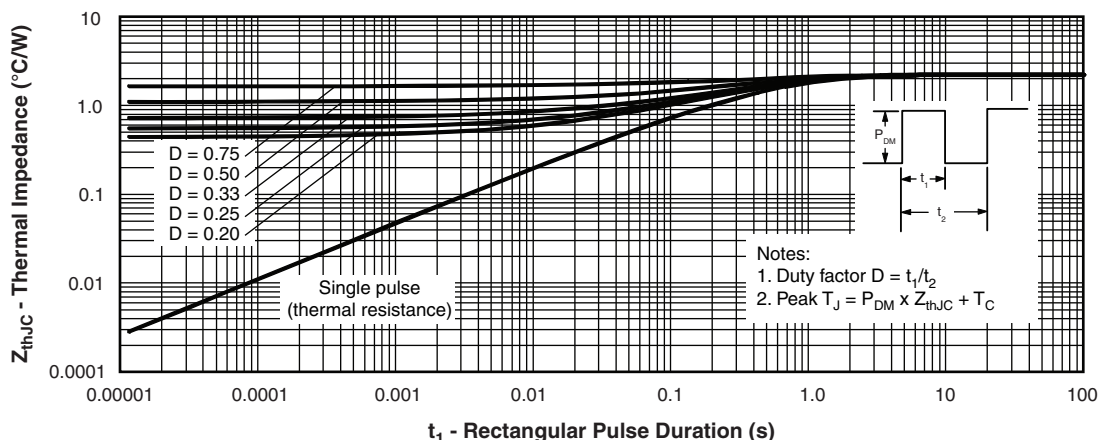
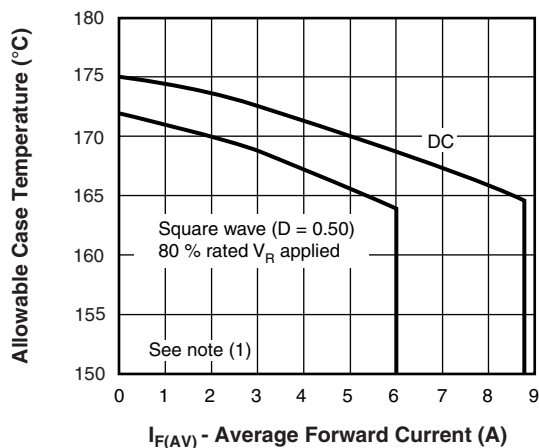

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

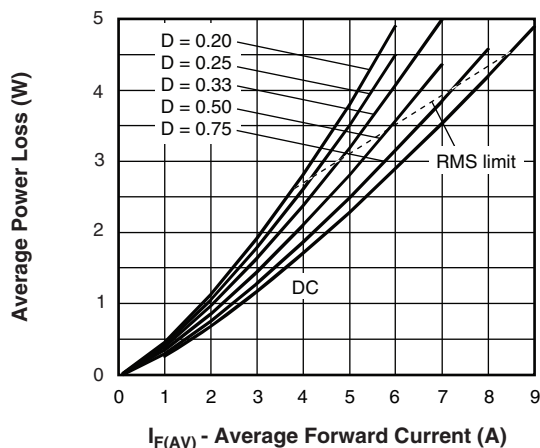


Fig. 6 - Forward Power Loss Characteristics

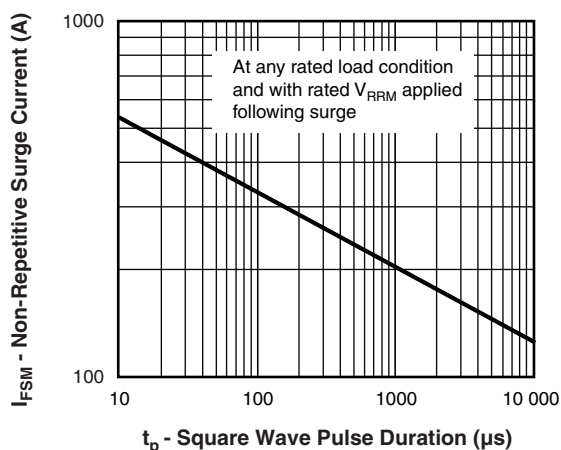


Fig. 7 - Maximum Non-Repetitive Surge Current

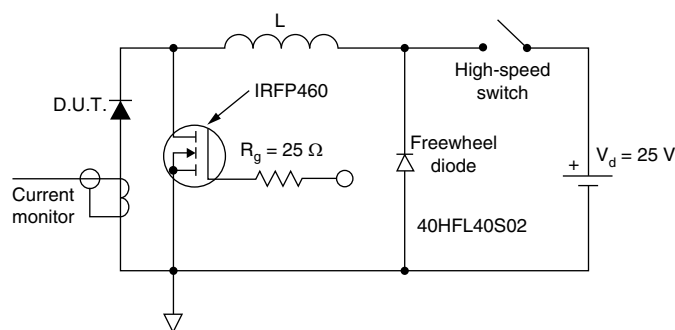


Fig. 8 - Unclamped Inductive Test Circuit

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

Device code	VS-	6	T	Q	045	S	TRL	-M3
	1	2	3	4	5	6	7	8
1	Vishay Semiconductors product							
2	Current rating (6 A)							
3	Package: T = TO-220							
4	Schottky "Q" series							
5	Voltage ratings							
6	S = D <sup>2</sup> PAK (TO-263AB)							
7	<ul style="list-style-type: none"> <li>None = tube</li> <li>TRL = tape and reel (left oriented)</li> <li>TRR = tape and reel (right oriented)</li> </ul>							
8	-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free							

**ORDERING INFORMATION**

PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-6TQ035S-M3	50	1000	Antistatic plastic tubes
VS-6TQ035STRR-M3	800	800	13" diameter reel
VS-6TQ035STRL-M3	800	800	13" diameter reel
VS-6TQ040S-M3	50	1000	Antistatic plastic tubes
VS-6TQ040STRR-M3	800	800	13" diameter reel
VS-6TQ040STRL-M3	800	800	13" diameter reel
VS-6TQ045S-M3	50	1000	Antistatic plastic tubes
VS-6TQ045STRR-M3	800	800	13" diameter reel
VS-6TQ045STRL-M3	800	800	13" diameter reel

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?96164">www.vishay.com/doc?96164</a>
Part marking information	<a href="http://www.vishay.com/doc?95444">www.vishay.com/doc?95444</a>
Packaging information	<a href="http://www.vishay.com/doc?96424">www.vishay.com/doc?96424</a>

### D<sup>2</sup>PAK

#### DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D<sup>2</sup>PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

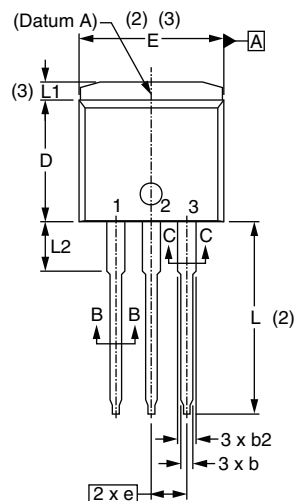
#### Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC® outline TO-263AB

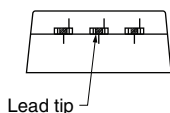
## TO-262

### DIMENSIONS in millimeters and inches

#### Modified JEDEC outline TO-262



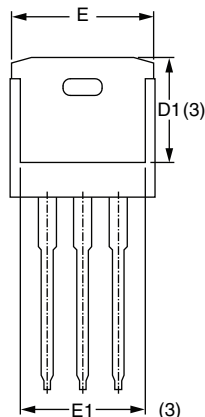
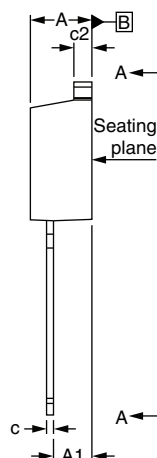
$\pm 0.010$  A A B



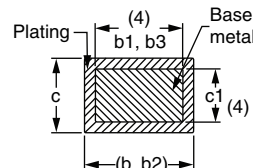
#### Lead assignments

##### Diodes

1. - Anode (two die)/open (one die)
2. - Cathode
3. - Anode



Section A - A



Section B - B and C - C

Scale: None

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	2.03	3.02	0.080	0.119	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
L	13.46	14.10	0.530	0.555	
L1	-	1.65	-	0.065	3
L2	3.56	3.71	0.140	0.146	

#### Notes

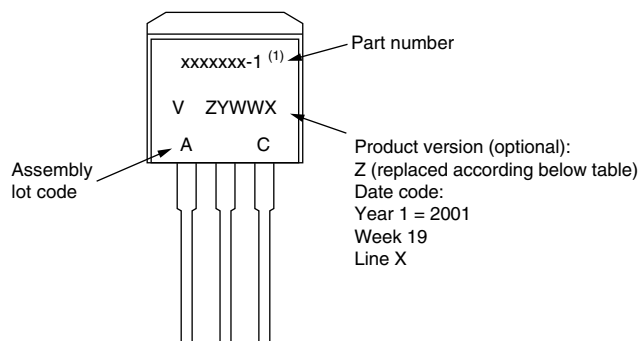
- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1

- (4) Dimension b1 and c1 apply to base metal only

- (5) Controlling dimension: inches

- (6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum) and D1 (minimum) where dimensions derived the actual package outline

## TO-262



Example: This is a xxxxxx-1 <sup>(1)</sup> with assembly lot code AC, assembled on WW 19, 2001 in the assembly line "X"

### Note

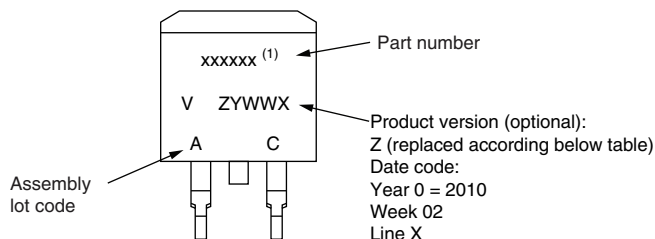
(1) If part number contain "H" as last digit, product is AEC-Q101 qualified

ENVIRONMENTAL NAMING CODE (Z)	PRODUCT DEFINITION
A	Termination lead (Pb)-free
B	Totally lead (Pb)-free
E	RoHS-compliant and termination lead (Pb)-free
F	RoHS-compliant and totally lead (Pb)-free
M	Halogen-free, RoHS-compliant and termination lead (Pb)-free
N	Halogen-free, RoHS-compliant and totally lead (Pb)-free
G	Green





## D<sup>2</sup>PAK



Example: This is a xxxxxx <sup>(1)</sup> with assembly lot code AC, assembled on WW 02, 2010

### Note

(1) If part number contain "H" as last digit, product is AEC-Q101 qualified

ENVIRONMENTAL NAMING CODE (Z)	PRODUCT DEFINITION
A	Termination lead (Pb)-free
B	Totally lead (Pb)-free
E	RoHS-compliant and termination lead (Pb)-free
F	RoHS-compliant and totally lead (Pb)-free
M	Halogen-free, RoHS-compliant, and termination lead (Pb)-free
N	Halogen-free, RoHS-compliant, and totally lead (Pb)-free
G	Green



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