

HY4504B-VB Datasheet N-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY					
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^{a, c}	Q _g (Typ.)		
40	0.0017 at V _{GS} = 10 V	150	120 nC		
	0.0025 at V_{GS} = 4.5 V	135			



FEATURES

- Trench Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

- Synchronous Rectification
- Power Supplies

ABSOLUTE MAXIMUM RATINGS $T_A = 25 \text{ °C}$, unless otherwise noted						
Parameter	Symbol	Limit	Unit			
Drain-Source Voltage	V _{DS}	40	V			
Gate-Source Voltage	V _{GS}	± 25				
	T _C = 25 °C		150 ^{a, c}			
Continuous Drain Current (T $= 175 ^{\circ}\text{C}$)	T _C = 70 °C		120 ^c			
Continuous Drain Current $(T_j = T/3, C)$	T _A = 25 °C	'D	29 ^b	A		
	T _A = 70 °C		23 ^b			
Pulsed Drain Current		I _{DM}	380			
Avalanche Current Pulse	L = 0.1 mH	I _{AS}	80			
Single Pulse Avalanche Energy		E _{AS}	320	mJ		
Continuous Source Drein Diede Current	T _C = 25 °C	le.	110 ^{a, c}	A		
Continuous Source-Drain Diode Current	T _A = 25 °C	'S	2.6 ^b			
	T _C = 25 °C		312 ^a	W		
Maximum Davian Disaination	T _C = 70 °C		200			
	T _A = 25 °C	ГD	3.13 ^b			
	T _A = 70 °C		2.0 ^b			
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C			

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^b	Steady State	R _{thJA}	32	40	°C ///	
Maximum Junction-to-Case	Steady State	R _{thJC}	0.33	0.4	0/11	

Notes:

a. Based on T_C = 25 °C.

b. Surface Mounted on 1" x 1" FR4 board.

c. Calculated based on maximum junction temperature. Package limitation current is 110 A.

Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static	•					•	
Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 V, I_{D} = 250 \mu A$	45			V	
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$			41			
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	$\Delta V_{GS(th)}/T_{J}$ $I_{D} = 250 \mu A$		- 8		mv/°C	
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_D = 250 \ \mu A$	1.2		2.5	V	
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA	
Zara Cata Valtaga Drain Current		$V_{DS} = 40 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			1	μA	
Zero Gate voltage Drain Current	DSS	$V_{DS} = 40 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 55 \text{ °C}$			10		
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 \text{ V}, \text{ V}_{GS} = 10 \text{ V}$	120			А	
	P	V _{GS} = 10 V, I _D = 30 A		0.0017		Ω	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 20 A		0.0025			
Forward Transconductance ^a	9 _{fs}	V _{DS} = 15 V, I _D = 30 A		180		S	
Dynamic ^b							
Input Capacitance	C _{iss}			9000		pF	
Output Capacitance	C _{oss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		650			
Reverse Transfer Capacitance	C _{rss}			450			
Total Gate Charge	Qg			120	180	nC	
Gate-Source Charge	Q _{gs}	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 20 A		30			
Gate-Drain Charge	Q _{gd}			16			
Gate Resistance	Rg	f = 1 MHz		0.85	1.3	Ω	
Turn-On Delay Time	t _{d(on)}			20	30		
Rise Time	t _r	$V_{\text{DD}} = 20 \text{ V}, \text{ R}_{\text{L}} = 1.0 \Omega$ $\text{I}_{\text{D}} \cong 20 \text{ A}, \text{ V}_{\text{GEN}} = 10 \text{ V}, \text{ R}_{\text{g}} = 1 \Omega$		11	17	- - - - -	
Turn-Off Delay Time	t _{d(off)}			77	115		
Fall Time	t _f			10	15		
Turn-On Delay Time	t _{d(on)}			102	155		
Rise Time	t _r	V_{DD} = 20 V, R_L = 1.0 Ω		62	95		
Turn-Off Delay Time	t _{d(off)}	$I_D \cong$ 20 A, V_{GEN} = 4.5 V, R_g = 1 Ω		180	270		
Fall Time	t _f			60	90		
Drain-Source Body Diode Characteristic	s						
Continuous Source-Drain Diode Current	۱ _S	T _C = 25 °C			110	Δ	
Pulse Diode Forward Current ^a	I _{SM}				200		
Body Diode Voltage	V _{SD}	I _S = 20 A		0.8	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}			50	75	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			70	105	nC	
Reverse Recovery Fall Time	t _a	$F = 20 \text{ A}, \text{ u/ul} = 100 \text{ A/}\mu\text{s}, T_{\text{J}} = 25 \text{ °C}$		30		ns	
Reverse Recovery Rise Time	t _b			20			

Notes:

a. Pulse test; pulse width \leq 300 $\mu s,$ duty cycle \leq 2 %.

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

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted







TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

* The power dissipation P_D is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



Normalized Thermal Transient Impedance, Junction-to-Case



RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads Dimensions in Inches/(mm)



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