IRFZ48

Vishay Siliconix



TO-220AB

PRODUCT SUMMARY

V_{DS} (V)

R_{DS(on)} (Ω)

Q_{gs} (nC)

Q_{gd} (nC)

Q_q (Max.) (nC)

Configuration

Power MOSFET

S

N-Channel MOSFET

0.018

60

110

29

36

Single

 $V_{GS} = 10 V$

FEATURES

- Dynamic dV/dt rating
- Repetitive avalanche rated
- Ultra low on-resistance
- Very low thermal resistance
- 175 °C operating temperature
- Fast switching
- · Ease of paralleling
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

DESCRIPTION

Third generation power MOSFETs from Vishay provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220AB package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 W. The low thermal resistance and low package cost of the TO-220AB contribute to its wide acceptance throughout the industry.

ORDERING INFORMATION				
Package	TO-220AB			
Lead (Pb)-free	IRFZ48PbF			

ABSOLUTE MAXIMUM RATINGS (T_C	= 25 C, uni	less otherwis	se noted)		-	
PARAMETER			SYMBOL	LIMIT	UNIT	
Drain-source voltage			V _{DS}	60	V	
Gate-source voltage			V _{GS}	± 20	v	
Continuous drain current	V _{GS} at 10 V	T _C = 25 °C	1-	50		
		T _C = 100 °C	ID	50	A	
Pulsed drain current ^a			I _{DM}	290		
Linear derating factor				1.3	W/°C	
Single pulse avalanche energy ^b			E _{AS}	100	mJ	
Repetitive avalanche current ^a			I _{AR}	50	А	
Repetitive avalanche energy ^a			E _{AR}	19	mJ	
Maximum power dissipation $T_{\rm C} = 25 ^{\circ}{\rm C}$			P _D	190	W	
Peak diode recovery dV/dt ^c			dV/dt	4.5	V/ns	
Operating junction and storage temperature range			T _J , T _{stg}	- 55 to + 175	°C	
Soldering recommendations (peak temperature) ^d	For 10 s			300		
Mounting torque	6-32 or M3 screw			10	lbf ∙ in	
Mounting torque				1.1	N · m	

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)

b. V_{DD} = 25 V, starting T_J = 25 °C, L = 22 µH, R_g = 25 Ω I_{AS} = 72 A (see fig. 12)

c. $I_{SD} \le 72$ A, dl/dt ≤ 200 A/µs, $V_{DD} \le V_{DS}$, $T_J \le 175$ °C

d. 1.6 mm from case

e. Current limited by the package, (die current = 72 A)

S21-0340-Rev. C, 12-Apr-2021



www.vishay.com

SHAY

Vishay Siliconix

Static VDS VGS = 0 V, ID = 250 µA 60 - - V Orain-source breakdown voltage V_{DS} $V_{GS} = 0 V, ID = 250 µA$ 60 - - V//C Gate-source threshold voltage V_{DS} $V_{DS} = V_{CS}, ID = 250 µA$ 2.0 - 4.0 V Gate-source leakage IGSS $V_{DS} = 420$ - - ± 100 nA Zero gate voltage drain current IDSS $V_{DS} = 48 V, V_{SS} = 0 V$ - - 250 µA Drain-source on-state resistance Robin $V_{DS} = 10 V$ ID = 43 A ^b - 0.018 Ω Forward transconductance g_{rs} $V_{DS} = 25 V, I_D = 43 Ab$ - 0.018 Ω Input capacitance C_{ras} $V_{DS} = 25 V, I_D = 43 Ab$ - - 100 - Input capacitance C_{ras} $V_{DS} = 25 V, I_D = 43 Ab$ - - 110 - - 100 - - 100 - - 100 - - <th colspan="9">THERMAL RESISTANCE RATINGS</th>	THERMAL RESISTANCE RATINGS								
Case-to-sink, flat, greased surface $R_{B,CS}$ 0.50 "C/W Maximum junction-to-case (drain) $R_{B,LC}$ - 0.80 SPECIFICATIONS ($T_J = 25$ °C, unless otherwise noted) TEST CONDITIONS MIN. TYP. MAX. UNI State Drain-source breakdown voltage V_{OS} $V_{OS} = 0$, $U_J = 250 \ \mu A$ 60 - - V/V Gate-source threshold voltage V_{OS} $V_{OS} = 0.7$, $U_J = 250 \ \mu A$ 2.0 - 4.0 V Gate-source threshold voltage V_{OS} $V_{OS} = 0.7$, $U_J = 150 \ ^{\circ}C$ - 2.0 - 4.0 V Case a voltage drain current U_{DS} $V_{OS} = 0.7$, $U_J = 150 \ ^{\circ}C$ - 2.5 μ Drain-source on-state resistance $P_{OS(crit}$ $V_{OS} = 2.5$, $V_J = 43 \ A^{D}$ - 0.018 Ω Dynamic Input capacitance C_{cris} $V_{OS} = 10 \ V$ $I_D = 72 \ A, V_{OS} = 48 \ V, V_{OS} = 413 \ V$ - $210 \ I_D$ Gate-orain charge $Q_{$	PARAMETER	SYMBOL	TYP.	TYP. MAX.		UNIT			
Maximum junction-to-case (drain) R_{HJC} - 0.80 SPECIFICATIONS (T _J = 25 °C, unless otherwise noted) Far. SYMBOL TEST CONDITIONS MIN. TYP. MAX. UNIT PARAMETER SYMBOL TEST CONDITIONS MIN. TYP. MAX. UNIT Static Drain-source breakdown voltage V_{DS} $V_{OS} = 0$ V, $I_D = 250 \ \mu A$ 60 - - V/V Gate-source treshold voltage V_{DS} $V_{OS} = 0.7$, $I_D = 250 \ \mu A$ 60 - 4.0 V Gate-source treshold voltage V_{DS} $V_{OS} = 0.7$, $I_D = 34.0$ 2.0 - 4.00 V Care source leakage I_{OSS} $V_{OS} = 0.7$, $I_D = 34.0^\circ$ - - 2.00 - Drain-source on-state resistance $R_{OS(w)}$ $V_{OS} = 0.7$, $V_{OS} = 0.7$, $V_{OS} = 48.7$, $V_{OS} = 0.7$, $V_{OS} = 25.7$, $I_D = 43.4^\circ$ - - 0.018 Ω Drain-source on-state resistance C_{Oss} $V_{OS} = 10.7$ $I_D = 72.A$, $V_{OS} = 48.7$, $-$ - 100 - - 100 - </td <td>Maximum junction-to-ambient</td> <td>R_{thJA}</td> <td colspan="2" rowspan="2"></td> <td></td> <td></td> <td colspan="2" rowspan="2">°C/W</td>	Maximum junction-to-ambient	R _{thJA}					°C/W		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Case-to-sink, flat, greased surface	R _{thCS}							
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Maximum junction-to-case (drain)	R _{thJC}	- 0.80				1		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$									
Static VDS VGS = 0 V, I_D = 250 µA 60 - - V Orain-source breakdown voltage $\Delta V_{DS}/T_J$ Reference to 25 °C, I_D = 1 mA - 0.060 - V/°C Gate-source threshold voltage V_{DS} to the shold voltage V_{CS} $V_{DS} = V_{CS}$, I_D = 250 µA 2.0 - 4.0 V Gate-source leakage I_{DSS} $V_{DS} = 0.5$, $I_D = 250 µA$ 2.0 - 4.0 V Zero gate voltage drain current I_{DSS} $V_{DS} = 60.V, V_{DS} = 0.V$ - - 250 $µA$ Drain-source on-state resistance $R_{DS(on)}$ $V_{GS} = 10.V$ $I_D = 43 A^D$ - - 0.018 Ω Dynamic Input capacitance C_{Gas} $V_{DS} = 25 V, I_D = 43 A^D$ - - 100 - Output capacitance C_{Gas} $V_{DS} = 25 V, I_D = 43 A^D$ - - 110 - - 2400 - - 1300 - pF Reverse transfer capacitance C_{Gas} $V_{CB} = 1$	SPECIFICATIONS (T _J = 25 °C, u	Inless otherw	ise noted)						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	PARAMETER	SYMBOL	TEST	n en		MIN.	TYP.	MAX.	UNIT
	Static						•		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Drain-source breakdown voltage	V _{DS}	V _{GS} = 0	V, I _D = 2	50 µA	60	-	-	V
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	V _{DS} temperature coefficient	$\Delta V_{DS}/T_{J}$	Reference to	o 25 °C,	I _D = 1 mA	-	0.060	-	V/°C
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Gate-source threshold voltage	V _{GS(th)}	$V_{DS} = V_{C}$	_{3S} , I _D = 2	50 µA	2.0	-	4.0	V
$ \begin{array}{ c c c c c c } \hline \mbox{Zero gate voltage drain current} & \mbox{Ds} = 48 V, V_{GS} = 0 V, T_J = 150 °C & - & - & 250 \\ \hline \mbox{V}_{DS} = 48 V, V_{GS} = 0 V, T_J = 150 °C & - & - & 250 \\ \hline \mbox{Drain-source on-state resistance} & R_{DS(on)} & V_{GS} = 10 V & I_D = 43 A^b & - & - & 0.018 & \Omega \\ \hline \mbox{Porward transconductance} & g_{fs} & V_{DS} = 25 V, I_D = 43 A^b & 27 & - & - & S \\ \hline \mbox{Dynmic} & & & & & & & & & & & & & & & & & & &$	Gate-source leakage	I _{GSS}	VG	_{as} = ± 20		-	-	± 100	nA
$ \begin{array}{ c c c c c c } \hline V_{DS} = 48 \ V, \ V_{OS} = 0 \ V, \ T_{J} = 150 \ ^{\circ}{\rm C} & - & - & 250 \ ^{\circ}{\rm T} \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$			$V_{DS} = 6$			-	-	25	
Forward transconductance g_{fs} $V_{DS} = 25 \text{ V}, I_D = 43 \text{ Ab}$ 27 $ S$ DynamicInput capacitance C_{iss} $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, I_D = 43 \text{ Ab}$ $ S$ Output capacitance C_{oss} $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, I_D = 43 \text{ Ab}$ $ 1300$ $-$ Output capacitance C_{oss} $V_{GS} = 10 \text{ V}$ $I_D = 72 \text{ A}, V_{DS} = 48 \text{ V}, See fig. 6 and 13b$ $ 110$ Gate-drain charge Q_{gd} $V_{GS} = 10 \text{ V}$ $I_D = 72 \text{ A}, V_{DS} = 48 \text{ V}, See fig. 6 and 13b$ $ 290$ Gate-drain charge Q_{gd} $V_{GS} = 10 \text{ V}$ $I_D = 72 \text{ A}, V_{DS} = 48 \text{ V}, See fig. 6 and 13b$ $ -$ <t< td=""><td>Zero gate voltage drain current</td><td>IDSS</td><td colspan="2">V_{DS} = 48 V, V_{GS} = 0 V, T_J = 150 °C</td><td>-</td><td>-</td><td>250</td><td>μA</td></t<>	Zero gate voltage drain current	IDSS	V _{DS} = 48 V, V _{GS} = 0 V, T _J = 150 °C		-	-	250	μA	
DynamicInput capacitanceCiss $V_{GS} = 0 V$, $V_{DS} = 25 V$, f = 1.0 MHz, see fig. 5-2400-Output capacitanceCoss $r_{SS} = 25 V$, f = 1.0 MHz, see fig. 5-1300-Reverse transfer capacitanceCrss $V_{GS} = 10 V$ $I_D = 72 A$, $V_{DS} = 48 V$, see fig. 6 and 13b110Gate-source charge Q_{gd} $V_{GS} = 10 V$ $I_D = 72 A$, $V_{DS} = 48 V$, see fig. 6 and 13b110Gate-drain charge Q_{gd} $V_{GS} = 10 V$ $I_D = 72 A$, $V_{DS} = 48 V$, see fig. 6 and 13b290Gate-drain charge Q_{gd} $V_{GS} = 10 V$ $I_D = 72 A$, $V_{DS} = 48 V$, see fig. 6 and 13b36Turm-on delay time $t_{d(on)}$ $R_{g} = 9.1 \Omega$, $R_{D} = 0.34 \Omega$, see fig. 10b250-Fall time t_f $R_g = 9.1 \Omega$, $R_D = 0.34 \Omega$, see fig. 10b-250Internal drain inductance L_D Between lead, form package and center of die contact-4.5Internal source inductance L_S MOSFET symbol showing the integral reverse $p - n$ junction diode50°APulsed diode forward current a I_{SM} $T_J = 25 °C$, $I_F = 72 A$, $d/dt = 100 A/\mu s^b$ 2.0VBody diode reverse recovery time t_{rr} $T_J = 25 °C$, $I_F = 72 A$, $d/dt = 100 A/\mu s^b$ 2.0VBody diode reverse recovery charge Q_{rr} </td <td>Drain-source on-state resistance</td> <td>R_{DS(on)}</td> <td>V_{GS} = 10 V</td> <td>١</td> <td>_D = 43 A^b</td> <td>-</td> <td>-</td> <td>0.018</td> <td>Ω</td>	Drain-source on-state resistance	R _{DS(on)}	V _{GS} = 10 V	١	_D = 43 A ^b	-	-	0.018	Ω
$ \begin{array}{c c c c c c c c c } \hline Input capacitance & C_{iss} & V_{GS} = 0 V, & V_{DS} = 25 V, & f = 1.0 \ MHz, see fig. 5 & 190 & - & 190 & - & 190 & - & 110 & - & 190 & - & 110 & - & 290 & - & - & 36 & - & 100 & - & - & 100 & - & - & 100 & - & - & 36 & - & - & 36 & - & - & 36 & - & - & - & 36 & - & - & - & 36 & - & - & - & 36 & - & - & - & 36 & - & - & - & - & 36 & - & - & - & - & 36 & - & - & - & - & - & - & - & - & - & $	Forward transconductance		V _{DS} = 28	5 V, I _D =	43 A ^b	27	-	-	S
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Dynamic	l				1	I		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Input capacitance	C _{iss}	$V_{DS} = 25 V$,		-	2400	-	pF	
Heverse transfer capacitance C_{rss} -190-Total gate charge Q_g Gate-source charge Q_{gs} Gate-drain charge Q_{gd} Turn-on delay time $t_{d(on)}$ Rise time t_r Turn-off delay time $t_{d(off)}$ Fall time t_r Fall time t_r Internal drain inductance L_D Internal drain inductance L_D Drain-Source Body Diode CharacteristicsContinuous source-drain diode current l_S MOSFET symbol showing the integral reverse $ r_J = 25 ^\circ$, $l_F = 72 A$, $V_{GS} = 0 ^{\circ}$ $r_J = 25 ^\circ$, $l_F = 72 A$, $dl/dt = 100 A/\mu s^b$ $r_J = 25 ^\circ$, $l_F = 72 A$, $dl/dt = 100 A/\mu s^b$ $r_J = 25 ^\circ$, $l_F = 72 A$, $dl/dt = 100 A/\mu s^b$ $r_J = 25 ^\circ$, $l_F = 72 A$, $dl/dt = 100 A/\mu s^b$ $r_J = 25 ^\circ$, $l_F = 72 A$, $dl/dt = 100 A/\mu s^b$	Output capacitance	C _{oss}			-	1300	-		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Reverse transfer capacitance	C _{rss}	f = 1.0 N			-	190	-	1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Total gate charge	Qg				-	-	110	
Gate-drain charge Q_{gd} sec rig. 6 dir 1636Turn-on delay time $t_{d(on)}$ Rise time t_r Turn-off delay time $t_{d(off)}$ Fall time t_f Internal drain inductance L_D Internal source inductance L_S Drain-Source Body Diode CharacteristicsContinuous source-drain diode current I_S Pulsed diode forward current a I_S Body diode voltage V_{SD} Turn-off alge reverse recovery time t_{rr} Turn-off delay time t_{rr} Turn-off delay time t_{f} Body diode reverse recovery charge Q_{rr} Turn-off delay time t_{g} Turn-off delay time t_{g} Turn-off delay time t_{f} NosBetween lead, 6 mm (0.25°) from package and center of die contact f <t< td=""><td>Gate-source charge</td><td>-</td><td>V_{GS} = 10 V</td><td>l_D = 72</td><td>A, $V_{DS} = 48 V$,</td><td>-</td><td>-</td><td>29</td><td rowspan="2">nC</td></t<>	Gate-source charge	-	V _{GS} = 10 V	l _D = 72	A, $V_{DS} = 48 V$,	-	-	29	nC
$\begin{array}{c c c c c c c c } \hline Turn-on delay time & t_{d(on)} & & & & & & & & & & & & & & & & & & &$	Gate-drain charge	-		300 1	ig. 0 and 15	-	-	36	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Turn-on delay time					-	8.1	-	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Rise time		V _{DD} = 3	Vpp = 30 V Jp = 72 A		-	250	-	1
Fall time t_f -250-Internal drain inductance L_D Between lead, 6 mm (0.25") from package and center of die contact-4.5Internal source inductance L_S L_S I_S I_S 7.5-Drain-Source Body Diode CharacteristicsContinuous source-drain diode current I_S MOSFET symbol showing the integral reverse $p - n$ junction diode- I_S I_S - I_S -Body diode reverse recovery time V_{SD} $T_J = 25 ^\circ$ C, $I_F = 72 $ A, $dI/dt = 100 $ A/µsb- I_20 180nsBody diode reverse recovery charge Q_{rr} $T_J = 25 ^\circ$ C, $I_F = 72 $ A, $dI/dt = 100 $ A/µsb- I_20 180ns	Turn-off delay time	t _{d(off)}	$R_g = 9.1 \ \Omega, R_D = 0.34 \ \Omega, see fig. 10^{b}$		-	210	-	ns	
Internal drain inductanceLD6 mm (0.25") from package and center of die contact-4.5-nHInternal source inductanceLS L_S - 7.5 -nHDrain-Source Body Diode CharacteristicsContinuous source-drain diode currentISMOSFET symbol showing the integral reverse p - n junction diode 50° ABody diode reverse recovery time V_{SD} $T_J = 25 ^{\circ}C$, $I_F = 72 A$, $dI/dt = 100 A/\mu s^b$ 2.0 VContinuous diode reverse recovery charge Q_{rr} T $25 ^{\circ}C$, $I_F = 72 A$, $dI/dt = 100 A/\mu s^b$ - $120 180 ns$	Fall time				-	250	-		
Internal source inductanceLSPackage and contactImage	Internal drain inductance	L _D	6 mm (0.25") from a center of a context of a		-	4.5	-		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Internal source inductance	L _S			-	7.5	-	nH	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Drain-Source Body Diode Characteristic	cs							
Pulsed diode forward current aIsmIntegral reverse p - n junction diode290Body diode voltage V_{SD} $T_J = 25 \ ^{\circ}C$, $I_S = 72 \ ^{o}A$, $V_{GS} = 0 \ V^b$ 2.0VBody diode reverse recovery time t_{rr} $T_J = 25 \ ^{\circ}C$, $I_F = 72 \ ^{o}A$, $dI/dt = 100 \ ^{o}A/\mu s^b$ -120180nsBody diode reverse recovery charge Q_{rr} Q_{rr} $T_J = 25 \ ^{\circ}C$, $I_F = 72 \ ^{o}A$, $dI/dt = 100 \ ^{o}A/\mu s^b$ -0.500.80 μC	Continuous source-drain diode current	١ _S	showing the output of the showing the show		-	-	50 ^c	^	
Body diode reverse recovery time t_{rr} $T_J = 25 \ ^{\circ}C$, $I_F = 72 \ ^{\circ}A$, $dl/dt = 100 \ ^{\circ}A/\mu s^b$ -120180nsBody diode reverse recovery charge Q_{rr} $T_J = 25 \ ^{\circ}C$, $I_F = 72 \ ^{\circ}A$, $dl/dt = 100 \ ^{\circ}A/\mu s^b$ -0.500.80 μC	Pulsed diode forward current ^a	I _{SM}			-	-	290		
Body diode reverse recovery charge Q_{rr} $T_J = 25 \text{ °C}, I_F = 72 \text{ A}, dI/dt = 100 \text{ A/µs}^b$ - 0.50 0.80 µC	Body diode voltage	V _{SD}	$T_J = 25 \text{ °C}, I_S = 72 \text{ A}, V_{GS} = 0 \text{ V}^{b}$		-	-	2.0	V	
Body diode reverse recovery charge Q _{rr} - 0.50 0.80 µC	Body diode reverse recovery time	t _{rr}	- T _J = 25 °C, I _F = 72 A, dl/dt = 100 A/µs ^b		-	120	180	ns	
Forward turn-on time ton Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)	Body diode reverse recovery charge	Q _{rr}			-	0.50	0.80	μC	
	Forward turn-on time	t _{on}	Intrinsic turn-on time is negligible (turn-			I-on is do	minated b	y L _S and	L _D)

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)

b. Pulse width \leq 300 $\mu s;$ duty cycle \leq 2 $\,\%$

c. Current limited by the package, (die current = 72 A)

2





TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

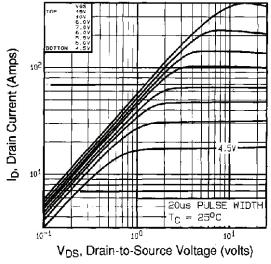


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

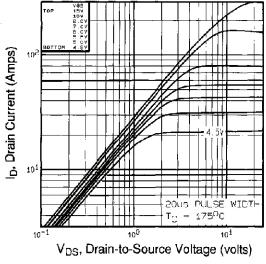
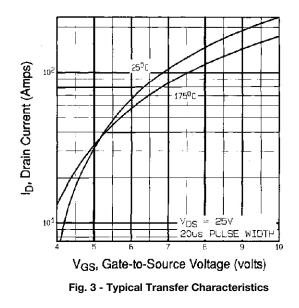


Fig. 2 - Typical Output Characteristics, $T_C = 175$ °C



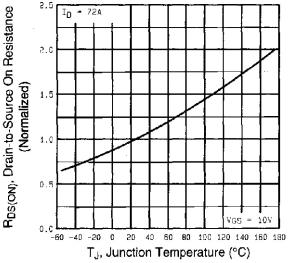


Fig. 4 - Normalized On-Resistance vs. Temperature

Vishay Siliconix



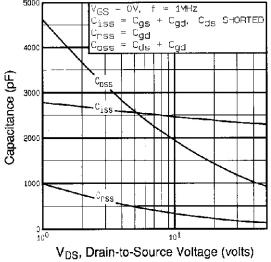


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

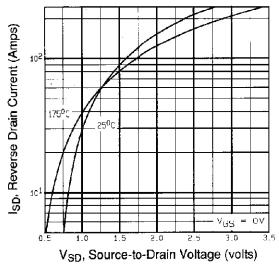


Fig. 7 - Typical Source-Drain Diode Forward Voltage

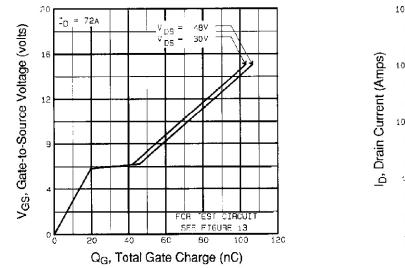
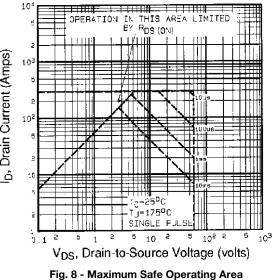


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage





IRFZ48

Vishay Siliconix

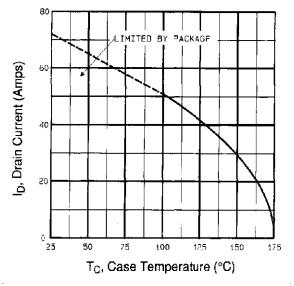


Fig. 9 - Maximum Drain Current vs. Case Temperature

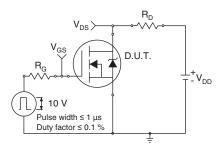


Fig. 10a - Switching Time Test Circuit

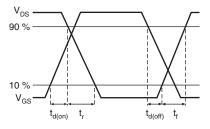


Fig. 10b - Switching Time Waveforms

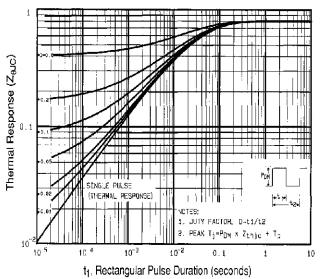


Fig. 10 - Maximum Effective Transient Thermal Impedance, Junction-to-Case



Vishay Siliconix

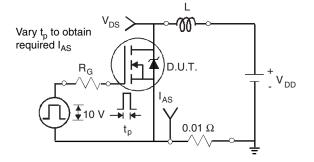


Fig. 12a - Unclamped Inductive Test Circuit

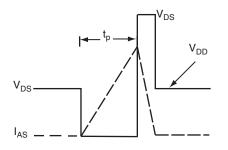


Fig. 12b - Unclamped Inductive Waveforms

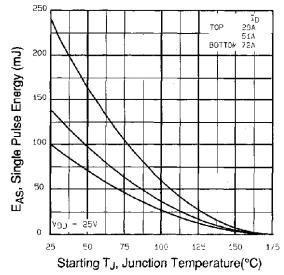


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

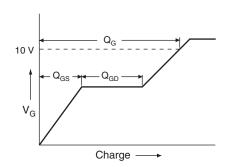


Fig. 13a - Basic Gate Charge Waveform

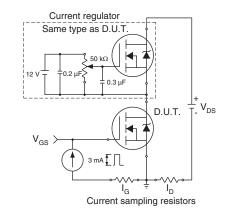
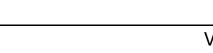


Fig. 13b - Gate Charge Test Circuit

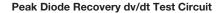
. 6

Document Number: 91294

For technical questions, contact: <u>hvm@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>



Vishay Siliconix



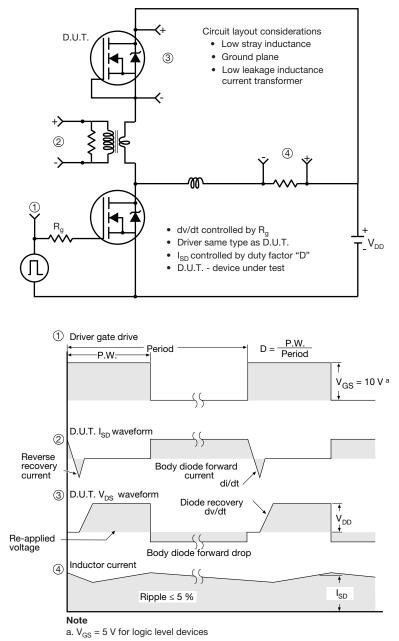


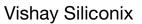
Fig. 14 - For N-Channel

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?91294.

SHAY

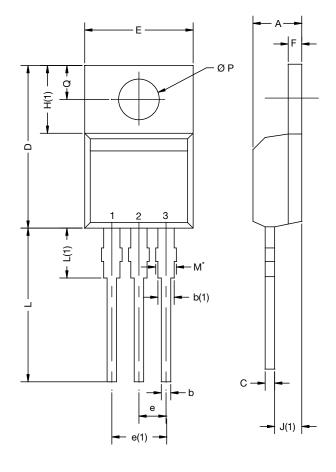
www.vishay.com

For technical questions, contact: <u>hvm@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>



www.vishay.com

TO-220-1



DIM.	MILLIN	IETERS	INCHES		
DIN.	MIN.	MIN. MAX.		MAX.	
А	4.24	4.65	0.167	0.183	
b	0.69	1.02	0.027	0.040	
b(1)	1.14	1.78	0.045	0.070	
С	0.36	0.61	0.014	0.024	
D	14.33	15.85	0.564	0.624	
E	9.96	10.52	0.392	0.414	
е	2.41	2.67	0.095	0.105	
e(1)	4.88	5.28	0.192	0.208	
F	1.14	1.40	0.045	0.055	
H(1)	6.10	6.71	0.240	0.264	
J(1)	2.41	2.92	0.095	0.115	
L	13.36	14.40	0.526	0.567	
L(1)	3.33	4.04	0.131	0.159	
ØР	3.53	3.94	0.139	0.155	
Q	2.54	3.00	0.100	0.118	
ECN: X15-0364-Rev. C, 14-Dec-15 DWG: 6031					

Note

- M^{\star} = 0.052 inches to 0.064 inches (dimension including protrusion), heatsink hole for HVM

Package Picture					
AS	3E	Xi'an			
		IRF 9510 744K AB			

Revison: 14-Dec-15

1 For technical questions, contact: <u>hvm@vishay.com</u> Document Number: 66542

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000



Vishay

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET category:

Click to view products by Vishay manufacturer:

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L SBVS138LT1G 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C BUK954R8-60E DMN3404LQ-7 NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE455 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 DMN2080UCB4-7 TK10A80W,S4X(S SSM6P69NU,LF DMP22D4UFO-7B