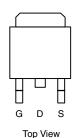


COMPLIANT

IRLW640-VB Datasheet N-Channel 200 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY				
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)		
200	0.048 at V _{GS} = 10 V	40		
	0.060 at V _{GS} = 6.5 V	35		



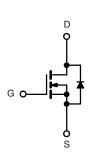
TO-263

FEATURES

- Trench Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- PWM Optimized for Fast Switching
- Compliant to RoHS Directive 2002/95/EC

APPLICATIONS

Isolated DC/DC Converters
 Primary-Side Switch



N-Channel MOSFET

ABSOLUTE MAXIMUM RATIN	GS (T _C = 25 °C, unless c	otherwise noted)			
Parameter	Symbol	Limit	Unit		
Drain-Source Voltage		V _{DS}	200	V	
Gate-Source Voltage	V _{GS}	± 20	20 V		
Continuous Drain Current ($T_1 = 175 \text{ °C}$)	T _C = 25 °C	1-	40		
	T _C = 125 °C	I _D	25		
Pulsed Drain Current	I _{DM}	80	A		
Avalanche Current	I _{AR}	20			
Repetitive Avalanche Energy ^a	L = 0.1 mH	E _{AR}	16.2	mJ	
Maximum Power Dissipation ^a	T _C = 25 °C	P	200 ^b	w	
	$T_A = 25 \ ^{\circ}C^{c}$		4.5		
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Limit	Unit	
Junction-to-Ambient	PCB Mount (TO-263) ^c	R _{thJA}	40	°C/W	
Junction-to-Case (Drain)		R _{thJC}	1	0/11	

Notes:

a. Duty cycle \leq 1 %.

b. See SOA curve for voltage derating.

c. When mounted on 1" square PCB (FR-4 material).

	SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
$\begin{array}{ c c c c c c } \hline \mbox{Drain-Source Breakdown Voltage} & V_{DS} & V_{DS} = V_{GS} = 0 \ V, \ V_{DS} = 250 \ \mu A & 2 & 4 & V \\ \hline \mbox{Gate-Threshold Voltage} & V_{GS(th)} & V_{DS} = V_{GS} \ v_{D} = 250 \ \mu A & 2 & 4 & V \\ \hline \mbox{Gate-Body Leakage} & \ & \ & \ & \ & \ & \ & \ & \ & \ & $	Parameter	Symbol	Test Conditions	Min .	Тур.	Max.	Unit
Gate-Threshold Voltage VGS(th) VDS = VGS, ID = 250 µA 2 4 V Gate-Body Leakage IGSS VDS = 0 V, VGS = ± 20 V ± 100 nA Zero Gate Voltage Drain Current IDSS VDS = 160 V, VGS = 0 V 1 µA Zero Gate Voltage Drain Current IDSS VDS = 160 V, VGS = 0 V, TJ = 125 °C 50 µA On-State Drain Current ^a ID(on) VDS = 160 V, VGS = 0 V, TJ = 125 °C 0.048 A Drain-Source On-State Resistance ^a PDS(on) VGS = 10 V, ID = 20 A, TJ = 125 °C 0.150 A Oryces = 0 V, VDS = 15 V, VDS = 10 V, ID = 20 A, TJ = 125 °C 0.180 A A Orges = 10 V, ID = 20 A, TJ = 125 °C 0.180 A A A Drain-Source on State Resistance Prose = 15 V, ID = 30 A 15 S S Dynamic ^b NDS = 15 V, VDS = 25 V, I = 1 MHz 300 PF PF Reverse Transfer Capacitance Crass VDS = 10 V, VDS = 25 V, I = 1 MHz 35 C Gate-Source Charge ^c Qg Gate-Soure Charge ^c Qg 35 <td>Static</td> <td>•</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Static	•					
$ \begin{array}{c c c c c c } \hline \mbox{Gate-Threshold Voltage} & V_{GS(th)} & V_{DS} = V_{GS, 1_D} = 250 \ \mu A & 2 & 4 & 1 \\ \hline \mbox{Gate-Bady Leakage} & l_{GSS} & V_{DS} = 0 \ V, \ V_{GS} = 20 \ V & 1 & 1 & 1 \\ \hline \mbox{V} & V_{DS} = 160 \ V, \ V_{GS} = 0 \ V & 1_{g} = 125 \ ^{\circ}C & 0 & 50 & 1 \\ \hline \mbox{V} & V_{DS} = 160 \ V, \ V_{GS} = 0 \ V, \ T_{J} = 125 \ ^{\circ}C & 0 & 250 & 0 \\ \hline \mbox{V} & V_{DS} = 160 \ V, \ V_{GS} = 0 \ V, \ T_{J} = 125 \ ^{\circ}C & 0 & 250 & 0 \\ \hline \mbox{V} & V_{DS} = 160 \ V, \ V_{GS} = 0 \ V, \ T_{J} = 125 \ ^{\circ}C & 0 & 0.048 & 0 \\ \hline \mbox{V} & V_{DS} = 160 \ V, \ V_{GS} = 0 \ V, \ T_{J} = 125 \ ^{\circ}C & 0 & 0.048 & 0 \\ \hline \mbox{V} & V_{DS} = 100 \ V, \ V_{DS} = 10 \ V, \ V_{DS} =$	Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 V, I_D = 250 \mu A$	200			v
$ \begin{array}{ c c c c c c } \hline V_{DS} = 160 \ V, V_{GS} = 0 \ V \\ \hline V_{DS} = 160 \ V, V_{GS} = 0 \ V, \ J_{2} = 125 \ C \\ \hline V_{DS} = 160 \ V, V_{GS} = 0 \ V, \ J_{2} = 125 \ C \\ \hline V_{DS} = 160 \ V, V_{GS} = 0 \ V, \ J_{2} = 125 \ C \\ \hline V_{DS} = 160 \ V, V_{GS} = 0 \ V, \ J_{2} = 125 \ C \\ \hline V_{DS} = 160 \ V, V_{GS} = 0 \ V, \ J_{2} = 125 \ C \\ \hline V_{DS} = 160 \ V, V_{GS} = 10 \ V, \ D_{S} = 10 \ V$	Gate-Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_D = 250 \ \mu A$	2		4	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Gate-Body Leakage	I _{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA
$\begin{tabular}{ c c c c c } \hline V_{DS} = 160 \ V, V_{GS} = 0 \ V, T_J = 175 \ ^{\circ} C & 250 \\ \hline V_{DS} = 160 \ V, V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 0.048 \\ \hline V_{GS} = 10 \ V, I_D = 20 \ A & 15 \\ \hline Drain-Source on State Resistance \ C_{ISS} \\ \hline Dynamic^{D} \\ \hline Drain-Source Charge^{C} \ C_{Qg} \\ \hline Coulput Capacitance \ C_{ISS} \\ \hline Coulput Capacitance \ C_{ISS} \\ \hline Output Capacitance \ C_{ISS} \\ \hline Coulput Capacitance \ C_{ISS} \\ \hline Cotal Gate -Drain Charge^{C} \ C_{Qg} \\ \hline Gate-Drain Charge^{C} \ C_{Qg} \\ \hline Gate-Drain Charge^{C} \ C_{Qg} \\ \hline Cater Charge^{C}$			$V_{DS} = 160 \text{ V}, V_{GS} = 0 \text{ V}$			1	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Zero Gate Voltage Drain Current	I _{DSS}	V_{DS} = 160 V, V_{GS} = 0 V, T_{J} = 125 °C			50	μA
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			$V_{DS} = 160 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 175 ^{\circ}\text{C}$			250	
$ \begin{array}{ c c c c c c c } \mbox{Drain-Source On-State Resistance} & $P_{DS(on)}$ & $V_{GS} = 10 \ V, \ I_{D} = 20 \ A, \ T_{J} = 125 \ ^{\circ}{\rm C} & $0.150 & $1$$ \\ \hline V_{GS} = 10 \ V, \ I_{D} = 20 \ A, \ T_{J} = 175 \ ^{\circ}{\rm C} & $0.160 & $1$$ \\ \hline V_{GS} = 10 \ V, \ I_{D} = 20 \ A, \ T_{J} = 175 \ ^{\circ}{\rm C} & $0.160 & $1$$ \\ \hline V_{GS} = 6.5 \ V, \ I_{D} = 15 \ A & $0.060 & $1$$ \\ \hline V_{GS} = 6.5 \ V, \ I_{D} = 30 \ A & $15 & $1$$ & $5$$ \\ \hline \end{tabular} & $$Dymaticb$ & $$$$ \\ \hline \end{tabular} & $$$$$ \\ \hline \end{tabular} & $$$$ \\ \hline \end{tabular} & $$$$$ \\ \hline \end{tabular} & $$$$ \\ \hline \end{tabular} & $$$$$ \\ \hline \end{tabular} & $$$$ \\ \hline \end{tabular} & $$$$$$$$$$$$$$$ \\ \hline \end{tabular} & $$$$$$$$$$$$$$$$$$$$ \\ \hline \end{tabular} & $$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$	On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 15 \text{ V}, \text{ V}_{GS} = 10 \text{ V}$	60			А
$ \begin{array}{ c c c c c c c c c } \hline \mbox{Hom} Gamma Gam$			V _{GS} = 10 V, I _D = 20 A		0.048		Ω
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Drain-Source On-State Resistance ^a	В	V_{GS} = 10 V, I _D = 20 A, T _J = 125 °C		0.150		
$ \begin{array}{c c c c c c c } \hline Forward Transconductance^a & g_{fs} & V_{DS} = 15 \ V, \ I_{D} = 30 \ A & 15 & & & S \\ \hline \mbox{Dynamic}^b & & & & & & & & & & & & & & & & & & &$		DS(on)	V_{GS} = 10 V, I _D = 20 A, T _J = 175 °C		0.180		
	Drain-Source on State Resistance		V _{GS} = 6.5 V, I _D = 15 A		0.060		
$ \begin{array}{ c c c c c c } \mbox{Input Capacitance} & C_{1SS} & V_{GS} = 0 \ V, \ V_{DS} = 25 \ V, \ f = 1 \ MHz & 300 & pF \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Forward Transconductance ^a	9 _{fs}	V _{DS} = 15 V, I _D = 30 A	15			S
$ \begin{array}{c c c c c c c c c } \hline \mbox{Output Capacitance} & \mbox{C}_{OSS} & \mbox{V}_{GS} = 0 \ V, \ V_{DS} = 25 \ V, \ f = 1 \ MHz & \hline \mbox{300} & \mbox{med} & \mbox{pF} \\ \hline \mbox{Reverse Transfer Capacitance} & \mbox{C}_{rss} & \mbox{Q}_{g} & \mbox{V}_{DS} = 10 \ V, \ V_{DS} = 10$	Dynamic ^b	•	•	•	•		
$ \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}			2820		pF
$ \begin{array}{c c c c c c c c } \hline Total Gate Charge^{c} & Q_{g} \\ \hline Gate-Source Charge^{c} & Q_{gd} \\ \hline Gate-Source Charge^{c} & Q_{gd} \\ \hline Gate-Drain Charge^{c} & Q_{gd} \\ \hline Gate Resistance & R_{G} \\ \hline Turn-On Delay Time^{c} & t_{d(on)} \\ \hline Rise Time^{c} & t_{r} \\ \hline Turn-Off Delay Time^{c} & t_{d(off)} \\ \hline Fall Time^{c} & t_{f} \\ \hline \hline Source-Drain Diode Ratings and Characteristics (T_{C} = 25 °C)^{b} \\ \hline Continuous Current & I_{S} \\ \hline Pulsed Current & I_{SM} \\ \hline Forward Voltage^{a} & V_{SD} & I_{F} = 20 \text{ A}, V_{GS} = 0 \text{ V} \\ \hline I_{F} = 50 \text{ A}, dI/dt = 100 \text{ A/}\mu \text{s} \\ \hline I_{F} = 50 \text{ A}, dI/dt = 100 \text{ A/}\mu \text{s} \\ \hline \end{array} \begin{array}{c c c c c c c c c c c c c c c c c c c $	Output Capacitance	C _{oss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		300		
Gate-Source Charge ^c Q_{gs} $V_{DS} = 100 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$ 11 nC Gate-Drain Charge ^c Q_{gd} 14 14 14 14 14 14 14 14 14 14 14 14 14 15 2 Ω Ω 11 14 15 25 Ω Ω 15 25 Ω	Reverse Transfer Capacitance	C _{rss}			120		
$ \begin{array}{c c c c c c c } \hline Gate - Drain Charge^{\circ} & Q_{gd} & & & & & & & & & & & & & & & & & & &$	Total Gate Charge ^c	Qg			35		nC
$ \begin{array}{c c c c c c c c c } \hline Gate Resistance & R_G & & 2 & \Omega \\ \hline Turn-On Delay Time^{C} & t_{d(on)} & & & & & & & & & & & & & & & & & & &$	Gate-Source Charge ^c	Q _{gs}	$V_{DS} = 100 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 20 \text{ A}$		11		
$ \begin{array}{c c c c c c c c c } \hline Turn-On \ Delay \ Time^{\circ} & t_{d(on)} \\ \hline Rise \ Time^{\circ} & t_{r} \\ \hline Turn-Off \ Delay \ Time^{\circ} & t_{d(off)} \\ \hline Turn-Off \ Delay \ Time^{\circ} & t_{d(off)} \\ \hline Fall \ Time^{\circ} & t_{f} \\ \hline \end{array} & V_{DD} = 100 \ V, \ R_{L} = 5 \ \Omega \\ \hline l_{D} \cong 20 \ A, \ V_{GEN} = 10 \ V, \ R_{G} = 2.5 \ \Omega \\ \hline \end{array} & \begin{array}{c c c c c c c c c c c c c c c c c c c $	Gate-Drain Charge ^c	Q _{gd}			14		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Gate Resistance	R _G			2		Ω
$\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 ^c	t _{d(on)}			15	25	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Rise Time ^c	t _r	V_{DD} = 100 V, R_L = 5 Ω		35	55	ns
Source-Drain Diode Ratings and Characteristics $(T_C = 25 \ ^{\circ}C)^b$ Continuous CurrentIs40Pulsed CurrentIsM60Forward Voltage ^a V _{SD} I _F = 20 A, V _{GS} = 0 V1Reverse Recovery Time t_{rr} 115170nsPeak Reverse Recovery ChargeI _{RM(REC)} I _F = 50 A, dI/dt = 100 A/µs7.512A	Turn-Off Delay Time ^c	t _{d(off)}	$\text{I}_{\text{D}}\cong$ 20 A, V_{GEN} = 10 V, R_{G} = 2.5 Ω		40	60	
$\begin{array}{c c c c c c c c c } \hline Continuous Current & I_S & & & & & & & & & & & & & & & & & & &$	Fall Time ^c	t _f			30	45	
Pulsed CurrentI SMI Forward VoltageaAForward VoltageaV SDI F F I F11.5VReverse Recovery Time t_{rr} 115170nsPeak Reverse Recovery ChargeI RM(REC)I F F F I F <br< td=""><td>Source-Drain Diode Ratings and Cha</td><td>aracteristics (</td><td>$T_{\rm C} = 25 \ {}^{\circ}{\rm C})^{\rm b}$</td><td></td><td></td><td></td><td></td></br<>	Source-Drain Diode Ratings and Cha	aracteristics ($T_{\rm C} = 25 \ {}^{\circ}{\rm C})^{\rm b}$				
Pulsed Current I_{SM} 60Forward Voltage ^a V_{SD} $I_F = 20 \text{ A}, V_{GS} = 0 \text{ V}$ 11.5 V Reverse Recovery Time t_{rr} 115170nsPeak Reverse Recovery Charge $I_{RM(REC)}$ $I_F = 50 \text{ A}, dI/dt = 100 \text{ A}/\mu s$ 7.512A	Continuous Current					40	۸
Reverse Recovery Time t_{rr} 115170nsPeak Reverse Recovery Charge $I_{RM(REC)}$ $I_F = 50 \text{ A}, dI/dt = 100 \text{ A}/\mu s$ 7.512A	Pulsed Current	I _{SM}				60	
Reverse Recovery Time t_{rr} 115170nsPeak Reverse Recovery Charge $I_{RM(REC)}$ $I_F = 50 \text{ A}, dI/dt = 100 \text{ A}/\mu s$ 7.512A	Forward Voltage ^a	V _{SD}	$I_{F} = 20 \text{ A}, V_{GS} = 0 \text{ V}$		1	1.5	V
	Reverse Recovery Time				115	170	ns
Reverse Recovery ChargeQμC0.431.02μC	Peak Reverse Recovery Charge	I _{RM(REC)}	I _F = 50 A, dl/dt = 100 A/μs		7.5	12	А
	Reverse Recovery Charge	Q _{rr}			0.43	1.02	μC

Notes:

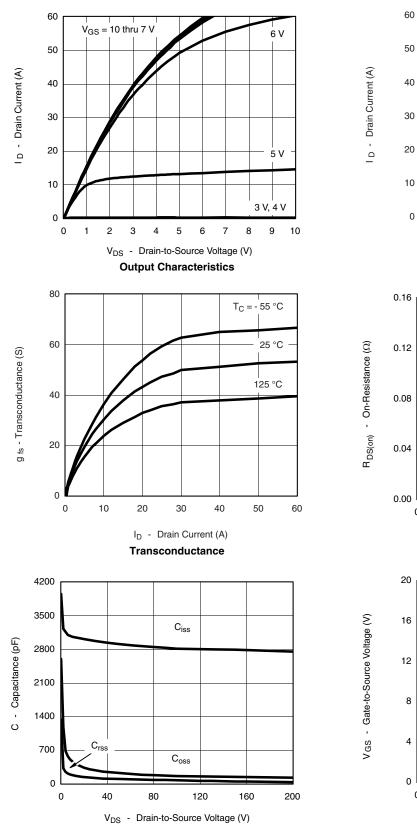
a. Pulse test; pulse width \leq 300 μ s, duty cycle \leq 2 %. b. Guaranteed by design, not subject to production testing.

c. Independent of operating temperature.

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.

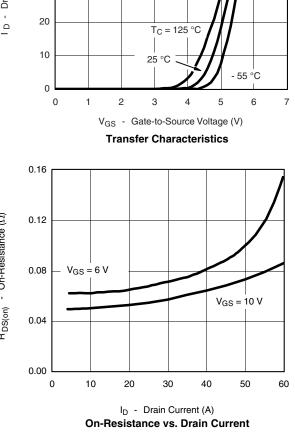
semi Bsemi.com

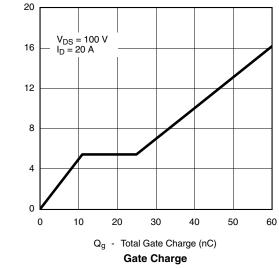




Capacitance

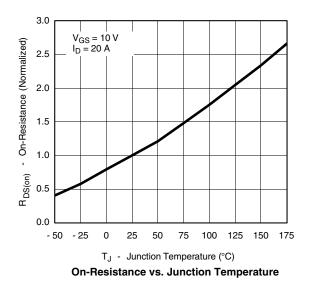
TYPICAL CHARACTERISTICS (25 °C unless noted)

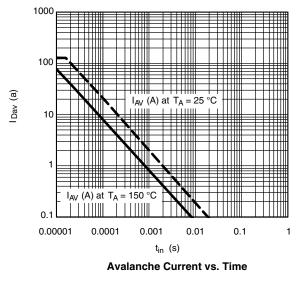


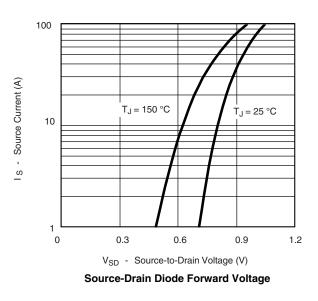


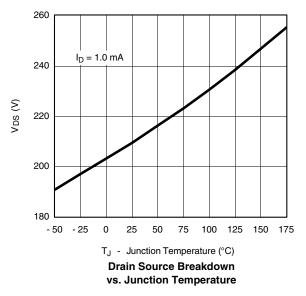


TYPICAL CHARACTERISTICS (25 °C unless noted)





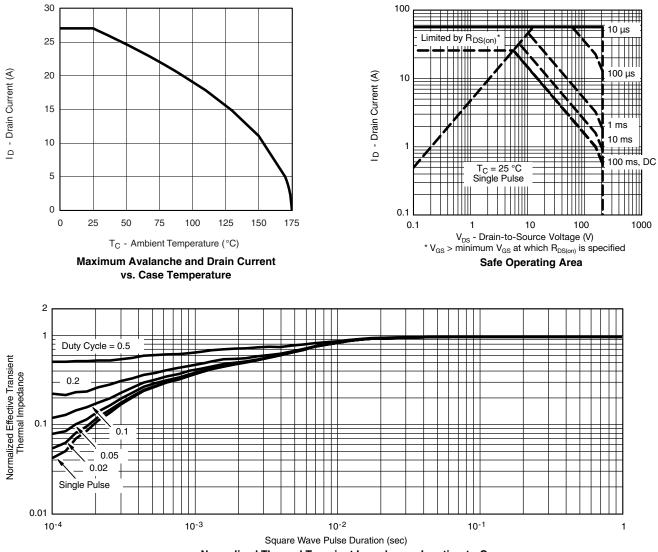




IRLW640-VB



THERMAL RATINGS



Normalized Thermal Transient Impedance, Junction-to-Case



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