

# FGA30S120P

## Shorted Anode™ IGBT

### Features

- High speed switching
- Low saturation voltage:  $V_{CE(sat)} = 1.75V @ I_C = 30A$
- High input impedance
- RoHS compliant

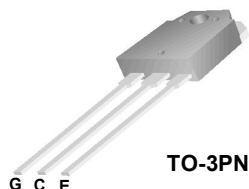
### Applications

- Induction Heating and Microwave Oven
- Soft switching Application

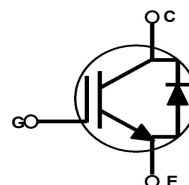


### General Description

Using advanced Field Stop Trench and ShortedAnode technology, Fairchild's Shorted Anode™ Trench IGBTs offer superior conduction and switching performances, and easy parallel operation with exceptional avalanche capability. This device is designed for Induction Heating and Microwave Oven.



TO-3PN



### Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Description	Ratings	Units
$V_{CES}$	Collector to Emitter Voltage	1300	V
$V_{GES}$	Gate to Emitter Voltage	$\pm 25$	V
$I_C$	Collector Current @ $T_C = 25^\circ C$	60	A
	Collector Current @ $T_C = 100^\circ C$	30	A
$I_{CM(1)}$	Pulsed Collector Current	90	A
$I_F$	Diode Continuous Forward Current @ $T_C = 25^\circ C$	60	A
	Diode Continuous Forward Current @ $T_C = 100^\circ C$	30	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ C$	348	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	174	W
$T_J$	Operating Junction Temperature	-55 to +175	$^\circ C$
$T_{stg}$	Storage Temperature Range	-55 to +175	$^\circ C$
$T_L$	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	--	0.43	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ C/W$

**Notes:**

1: Limited by  $T_{jmax}$

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGA30S120P	FGA30S120P	TO-3PN	-	-	30

### Electrical Characteristics of the IGBT T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
I <sub>CES</sub>	Collector Cut-Off Current	V <sub>CE</sub> = 1300, V <sub>GE</sub> = 0V	-	-	1	mA
I <sub>GES</sub>	G-E Leakage Current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V	-	-	±500	nA
<b>On Characteristics</b>						
V <sub>GE(th)</sub>	G-E Threshold Voltage	I <sub>C</sub> = 30mA, V <sub>CE</sub> = V <sub>GE</sub>	4.5	6.0	7.5	V
V <sub>CE(sat)</sub>	Collector to Emitter Saturation Voltage	I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V T <sub>C</sub> = 25°C	-	1.75	2.3	V
		I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V, T <sub>C</sub> = 125°C	-	1.85	-	V
		I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V, T <sub>C</sub> = 175°C	-	1.9	-	V
V <sub>FM</sub>	Diode Forward Voltage	I <sub>F</sub> = 30A, T <sub>C</sub> = 25°C	-	1.7	2.2	V
		I <sub>F</sub> = 30A, T <sub>C</sub> = 175°C	-	2.1	-	V
<b>Dynamic Characteristics</b>						
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30V, V <sub>GE</sub> = 0V, f = 1MHz	-	3345	4450	pF
C <sub>oes</sub>	Output Capacitance		-	75	100	pF
C <sub>res</sub>	Reverse Transfer Capacitance		-	60	90	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600V, I <sub>C</sub> = 30A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Resistive Load, T <sub>C</sub> = 25°C	-	39	50	ns
t <sub>r</sub>	Rise Time		-	360	465	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	620	805	ns
t <sub>f</sub>	Fall Time		-	160	210	ns
E <sub>on</sub>	Turn-On Switching Loss		-	1.3	1.7	mJ
E <sub>off</sub>	Turn-Off Switching Loss		-	1.22	1.6	mJ
E <sub>ts</sub>	Total Switching Loss		-	2.52	3.3	mJ
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600V, I <sub>C</sub> = 30A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Resistive Load, T <sub>C</sub> = 175°C	-	38	50	ns
t <sub>r</sub>	Rise Time		-	375	490	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	635	825	ns
t <sub>f</sub>	Fall Time		-	270	350	ns
E <sub>on</sub>	Turn-On Switching Loss		-	1.59	2.05	mJ
E <sub>off</sub>	Turn-Off Switching Loss		-	1.78	2.31	mJ
E <sub>ts</sub>	Total Switching Loss		-	3.37	4.36	mJ
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 600V, I <sub>C</sub> = 30A, V <sub>GE</sub> = 15V	-	78	115	nC
Q <sub>ge</sub>	Gate to Emitter Charge		-	4.2	6.3	nC
Q <sub>gc</sub>	Gate to Collector Charge		-	33.3	50	nC

## Typical Performance Characteristics

Figure 1. Typical Output Characteristics

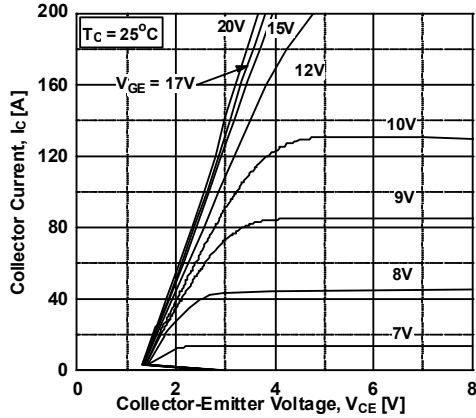


Figure 2. Typical Saturation Voltage Characteristics

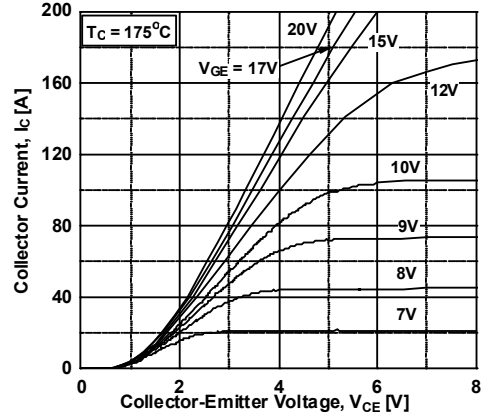


Figure 3. Typical Saturation Voltage Characteristics

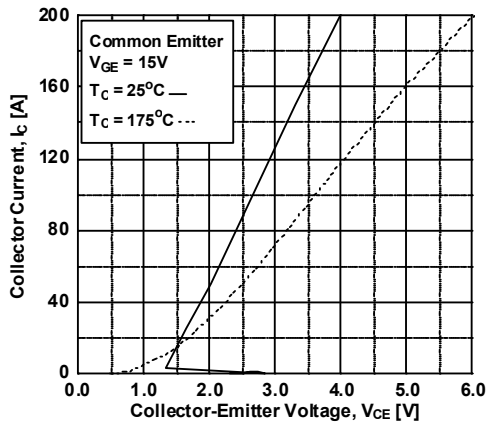


Figure 4. Transfer Characteristics

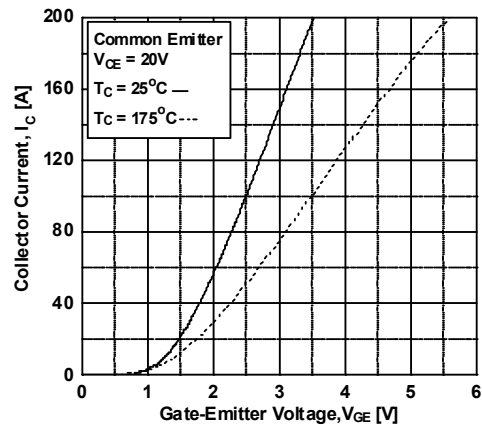


Figure 5. Saturation Voltage vs. Case

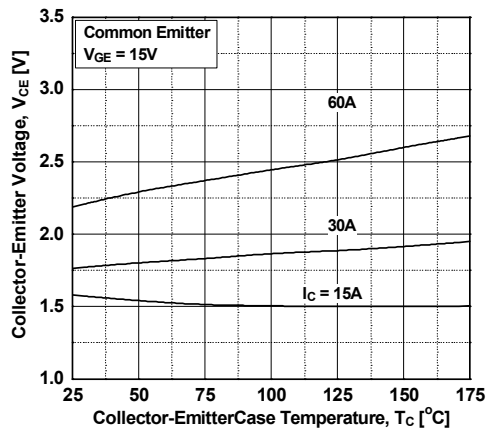
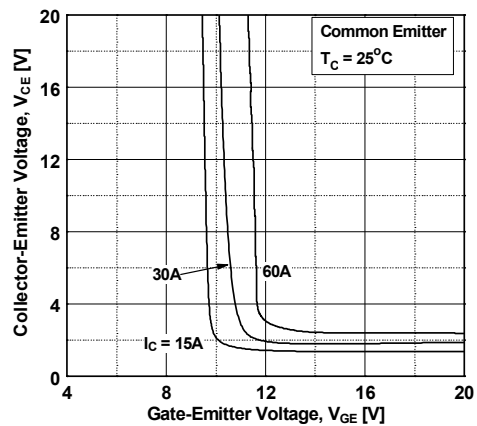


Figure 6. Saturation Voltage vs. Vge



## Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V<sub>ge</sub>

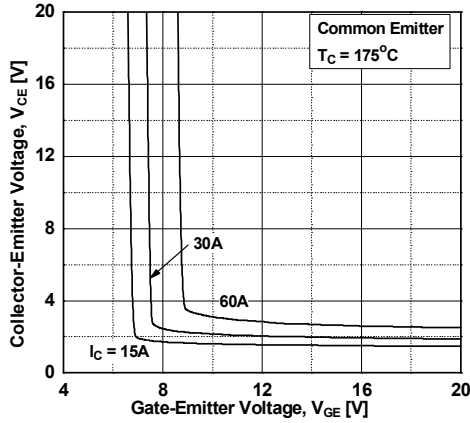


Figure 8. Capacitance Characteristics

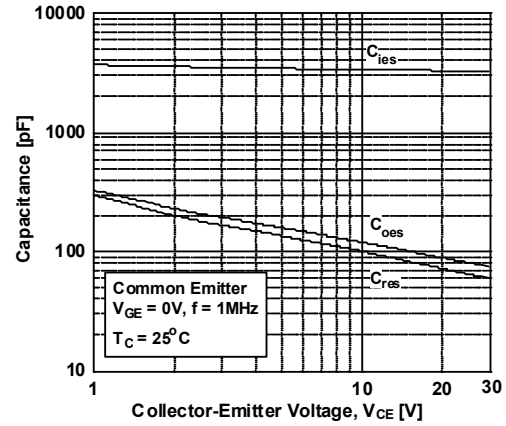


Figure 9. Gate Charge Characteristics

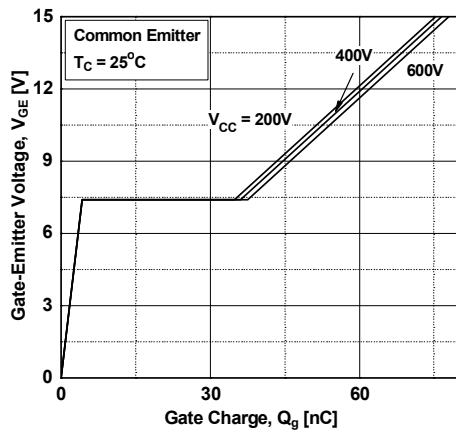


Figure 10. SOA Characteristics

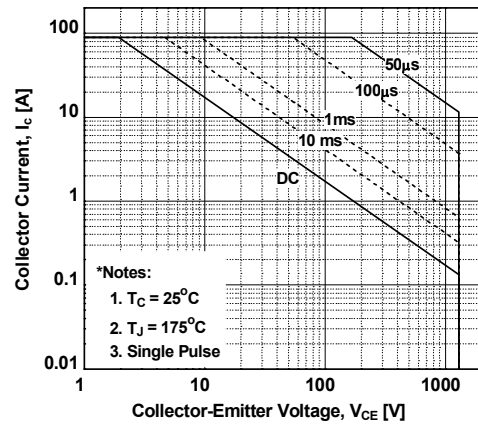


Figure 11. Turn-On Characteristics vs Gate Resistance

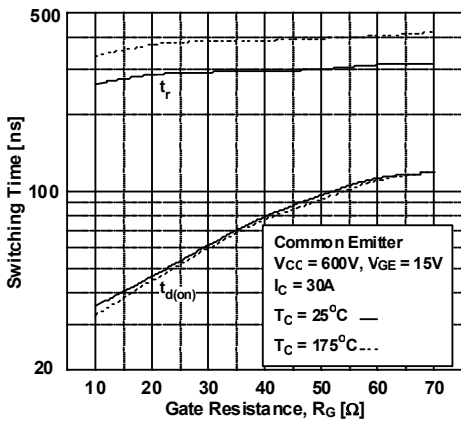
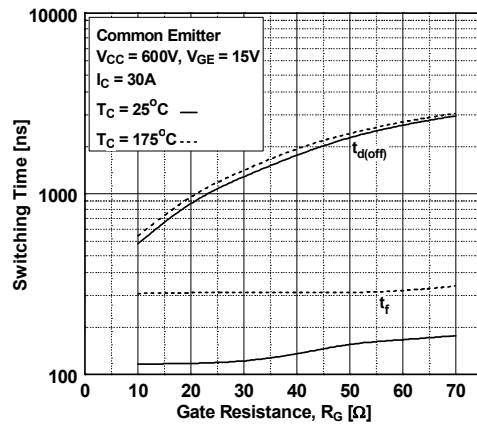
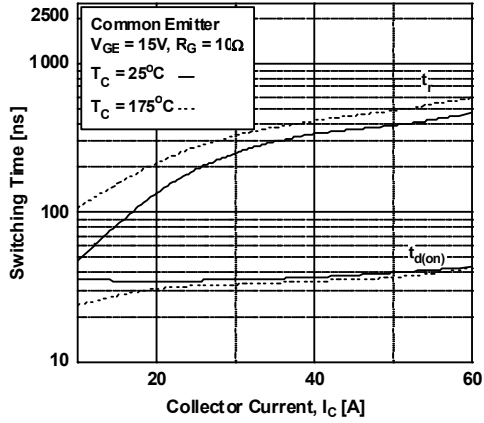


Figure 12. Turn-off Characteristics vs. Gate Resistance

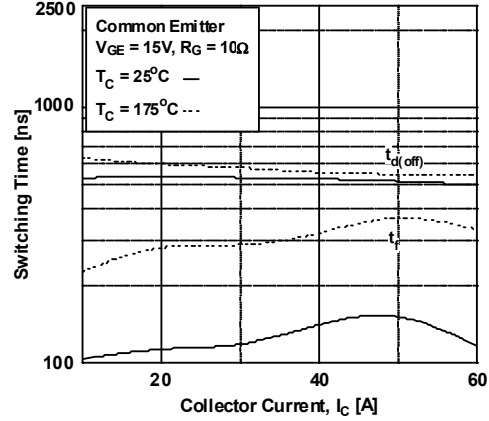


## Typical Performance Characteristics

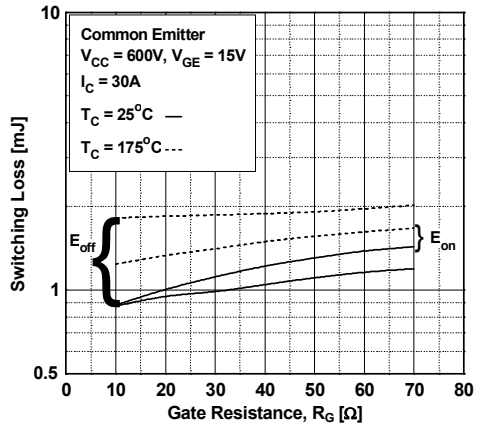
**Figure 13. Turn-on Characteristics VS. Collector Current**



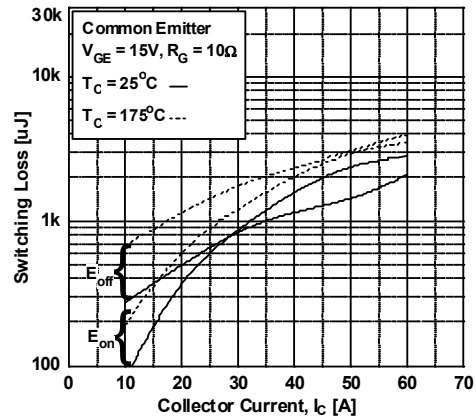
**Figure 14. Turn-off Characteristics VS. Collector Current**



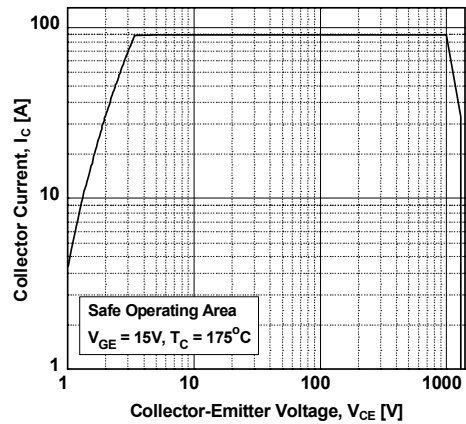
**Figure 15. Switching Loss VS. Gate Resistance**



**Figure 16. Switching Loss VS. Gate Resistance**



**Figure 17. Turn off Switching SOA Characteristics**



**Figure 18. Forward Characteristics**

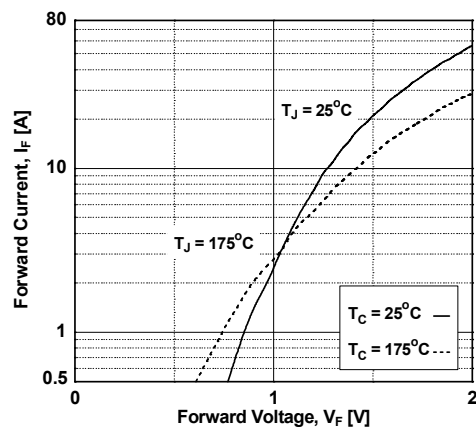
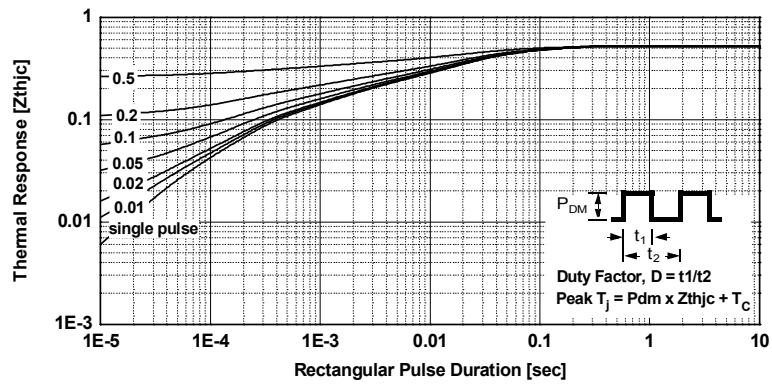
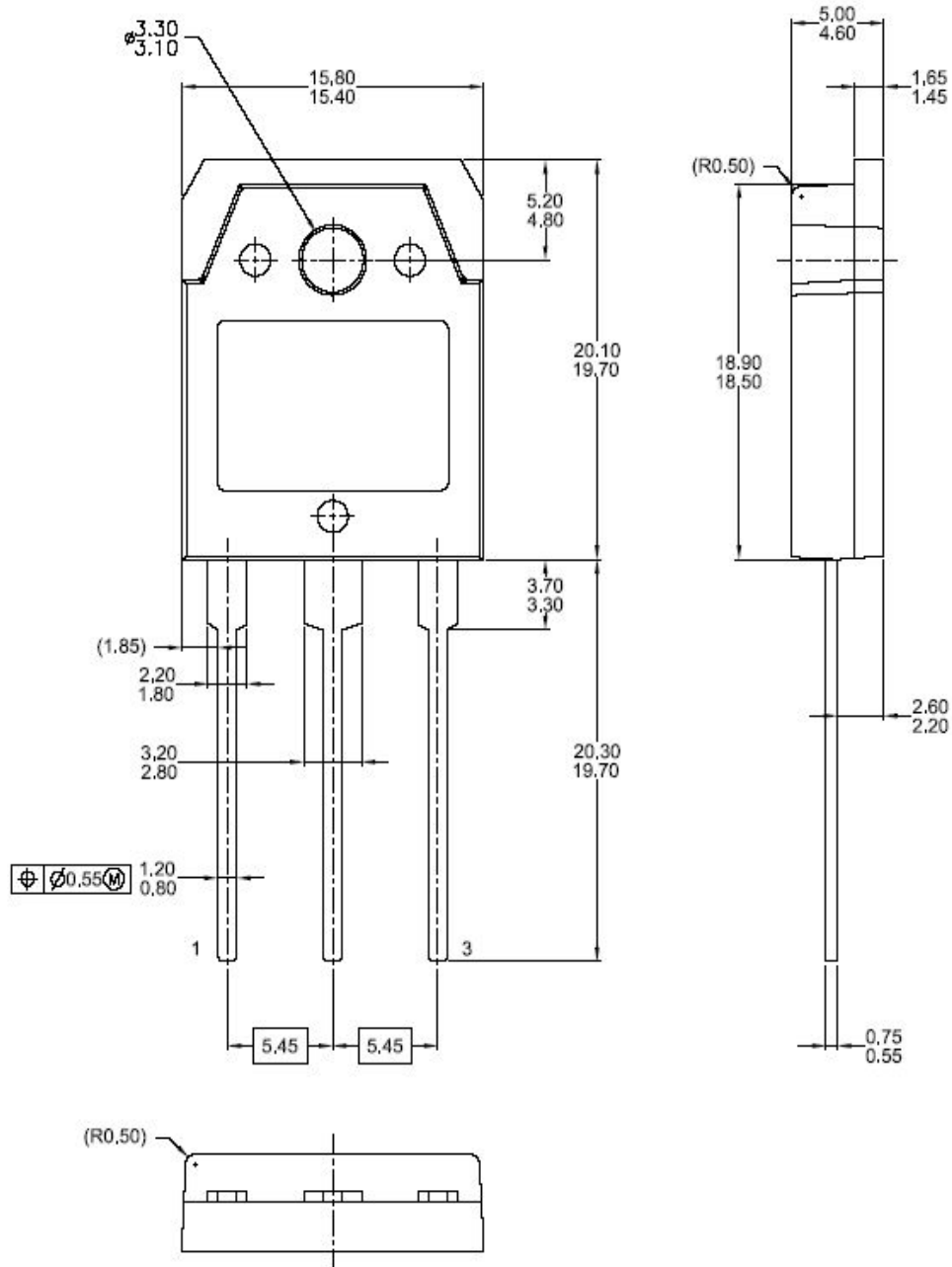


Figure 19. Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-3PN






Dimensions in Millimeters



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