

Features

- Low switching losses
- Maximum junction temperature 175 °C
- Positive temperature coefficient
- High ruggedness, temperature stable
- High short circuit capability(5us)
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note 2) ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Applications

- AC and DC servo drive amplifier
- Uninterruptible power supply
- Motion/servo control

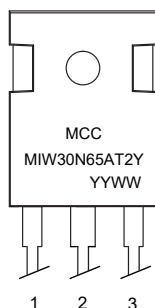
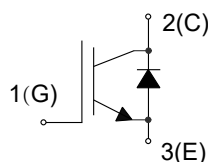
Maximum Ratings

Parameter	Symbol	Rating	Unit
Collector-Emitter Voltage	V_{CE}	650	V
DC Collector Current ^(Note 3)	I_C	60	A
		30	
Pulsed Collector Current, $V_{GE}=15V$ (Note 4)	$I_{C,pluse}$	90	A
Diode Forward Current ^(Note 3)	I_F	60	A
		30	
Diode Pulsed Current ^(Note 4)	$I_{F,pluse}$	90	A
Gate-Emitter Voltage	V_{GE}	±20	V
Transient Gate-Emitter Voltage ^(Note 5)		±30	
Turn off Safe Operating Area $V_{CE} \leq 650V$ $T_J \leq 150^\circ C$		90	A
Short Circuit Withstand Time ^(Note 6)	T_{SC}	5	us
Power Dissipation, $T_C=25^\circ C$	P_D	187	W

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.
3. Limited by T_{Jmax} .
4. T_p limited by T_{Jmax} .
5. $T_p \leq 10us$, Duty Cycle < 1%.
6. $V_{GE} = 15V$, $V_{CC} = 400V$, $V_{CEM} \leq 650V$

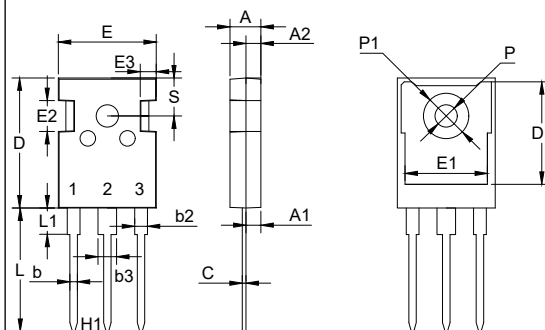
Internal Structure



Device Code: MIW30N65AT2Y
Date Code: YYWW (Year & Week)

Trench and Field Stop IGBT 650V 30A

TO-247AB



DIMENSIONS

DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.189	0.205	4.80	5.20	
A1	0.087	0.103	2.21	2.61	
A2	0.073	0.085	1.85	2.15	
b	0.039	0.055	1.00	1.40	
b2	0.075	0.087	1.91	2.21	
C	0.020	0.028	0.50	0.70	
D	0.815	0.839	20.70	21.30	
D1	0.640	0.663	16.25	16.85	
E	0.610	0.634	15.50	16.10	
E1	0.512	0.535	13.00	13.60	
E2	0.189	0.205	4.80	5.20	
E3	0.091	0.106	2.30	2.70	
L	0.772	0.796	19.62	20.22	
L1	-	0.169	-	4.30	
P	0.134	0.150	3.40	3.80	Φ
P1		0.287	-	7.30	Φ
S	0.242		6.15		TYP
H1	0.214		5.44		TYP
b3	0.110	0.126	2.80	3.20	

Electrical Characteristics of the IGBT @ T_J=25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
IGBT Static Characteristics						
Collector-Emitter Breakdown Voltage	V _{(BR)CES}	V _{GE} =0V, I _C =250μA	650			V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =30A, T _J =25°C		1.45	1.75	V
		V _{GE} =15V, I _C =30A, T _J =125°C		1.65		
		V _{GE} =15V, I _C =30A, T _J =150°C		1.75		
G-E Threshold Voltage	V _{GE(th)}	I _C =1mA, V _{CE} =V _{GE}	4.5	5.1	5.8	V
C-E Leakage Current	I _{CES}	V _{CE} =650V, V _{GE} =0V, T _J =25°C			0.25	mA
		V _{CE} =650V, V _{GE} =0V, T _J =150°C			4	
G-E Leakage Current	I _{GES}	V _{CE} =0V, V _{GE} =±20V			100	nA
Dynamic Characteristics						
Input Capacitance	C _{ies}	V _{CE} =25V, V _{GE} =0V, f=1MHz		2.03		nF
Reverse Transfer Capacitance	C _{res}			0.02		
Gate Charge	Q _g	V _{CC} =400V, I _C =30A, V _{GE} =15V		0.14		μC
Short Circuit Collector Current	I _{SC}	V _{GE} =15V, t _{sc} ≤5us, V _{CC} =400V, T _J ≤150°C		185		A
IGBT Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{CC} =400V, I _C =30A, V _{GE} =-5V~15V, R _G =20Ω, T _J =25°C		53		ns
Rise Time	t _r			58		
Turn-Off Delay Time	t _{d(off)}			139		
Fall Time	t _f			115		
Turn-On Energy	E _{on}			0.91		mJ
Turn-Off Energy	E _{off}			0.72		
Turn-On Delay Time	t _{d(on)}	V _{CC} =400V, I _C =30A, V _{GE} =-5V~15V, R _G =20Ω, T _J =125°C		49		ns
Rise Time	t _r			59		
Turn-Off Delay Time	t _{d(off)}			154		
Fall Time	t _f			163		
Turn-On Energy	E _{on}			0.99		mJ
Turn-Off Energy	E _{off}			0.93		
Turn-On Delay Time	t _{d(on)}	V _{CC} =400V, I _C =30A, V _{GE} =-5V~15V, R _G =20Ω, T _J =150°C		47		ns
Rise Time	t _r			60		
Turn-Off Delay Time	t _{d(off)}			161		
Fall Time	t _f			183		
Turn-On Energy	E _{on}			1.03		mJ
Turn-Off Energy	E _{off}			1.02		

Electrical Characteristics of the Diode @ $T_J=25^{\circ}\text{C}$ (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Characteristics						
Diode Forward Voltage	V_F	$V_{GE}=0\text{V}, I_F=30\text{A}, T_J=25^{\circ}\text{C}$		1.50	2.00	V
		$V_{GE}=0\text{V}, I_F=30\text{A}, T_J=125^{\circ}\text{C}$		1.40		
		$V_{GE}=0\text{V}, I_F=30\text{A}, T_J=150^{\circ}\text{C}$		1.35		
Reverse Recovery Current	I_{rr}	$V_R=400\text{V}, I_F=30\text{A},$ $di_F/dt=-450\text{A}/\mu\text{s}, T_J=25^{\circ}\text{C}$		14		A
Diode Reverse Recovery Time	t_{rr}			74		ns
Reverse Recovery Charge	Q_{rr}			0.58		μC
Reverse Recovery Energy	E_{rec}			0.09		mJ
Reverse Recovery Current	I_{rr}	$V_R=400\text{V}, I_F=30\text{A},$ $di_F/dt=-450\text{A}/\mu\text{s}, T_J=125^{\circ}\text{C}$		19		A
Diode Reverse Recovery Time	t_{rr}			106		ns
Reverse Recovery Charge	Q_{rr}			1.16		μC
Reverse Recovery Energy	E_{rec}			0.22		mJ
Reverse Recovery Current	I_{rr}	$V_R=400\text{V}, I_F=30\text{A},$ $di_F/dt=-450\text{A}/\mu\text{s}, T_J=150^{\circ}\text{C}$		21		A
Diode Reverse Recovery Time	t_{rr}			120		ns
Reverse Recovery Charge	Q_{rr}			1.41		μC
Reverse Recovery Energy	E_{rec}			0.27		mJ

Thermal characteristics

Parameter	Symbol	Min	Typ	Max	Units
Operating Junction Temperature Range	T_J	-40		175	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-55		150	$^{\circ}\text{C}$
Thermal Resistance from Junction to Case (IGBT)	$R_{th_{J-C}}$			0.8	$^{\circ}\text{C}/\text{W}$
Thermal Resistance from Junction to Case (Diode)	$R_{th_{J-C}}$			1.05	$^{\circ}\text{C}/\text{W}$
Thermal Resistance from Junction to Ambient	$R_{th_{J-A}}$			40	$^{\circ}\text{C}/\text{W}$

Curve Characteristics

Fig. 1 - Typical Output Characteristic($T_j=25^\circ\text{C}$)

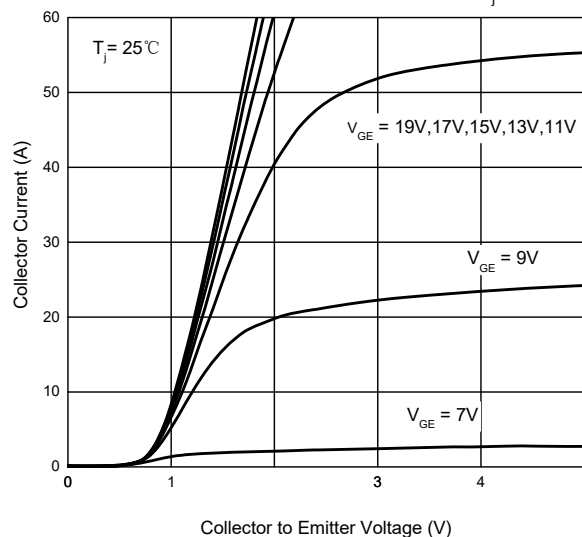


Fig. 2 - Typical Output Characteristic ($T_j=150^\circ\text{C}$)

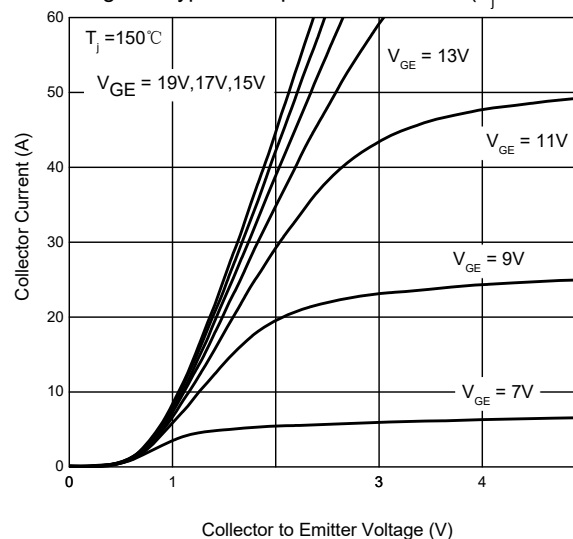


Fig. 3 - Typical Transfer Characteristic

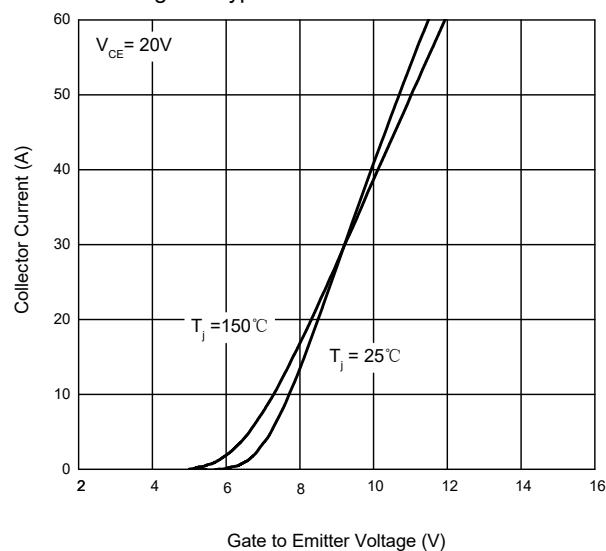


Fig. 4 - Diode Forward Current vs. Forward Voltage

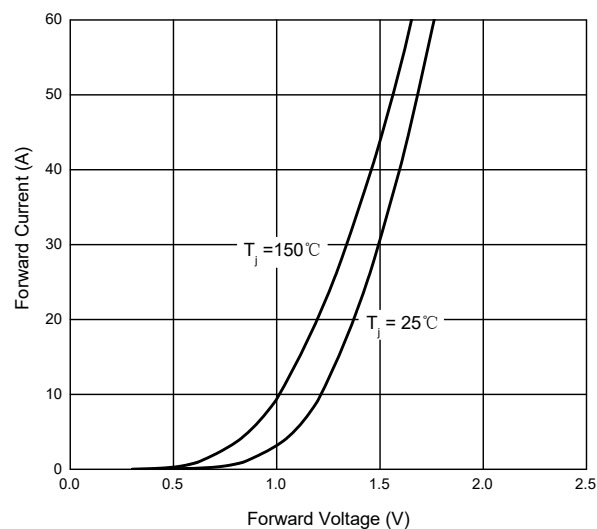


Fig. 6 - Capacitance Characteristics

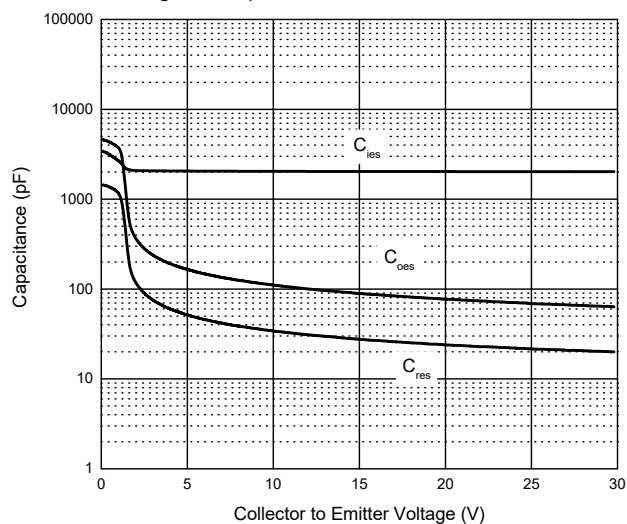
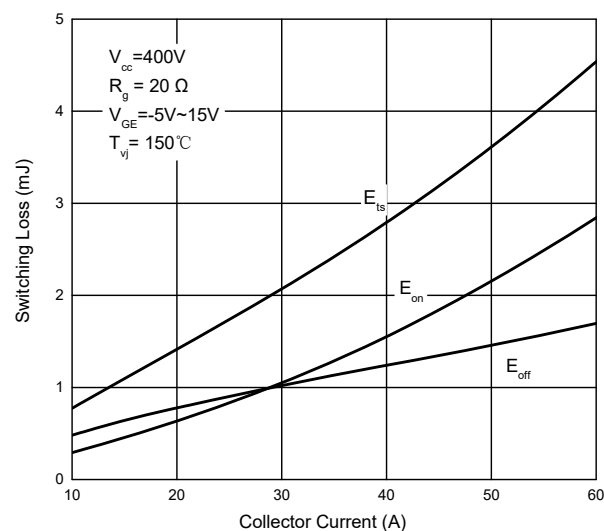


Fig. 7 - IGBT Switching Loss vs. IC



Curve Characteristics

Fig. 7 -IGBT Switching Loss vs. Junction Temperature

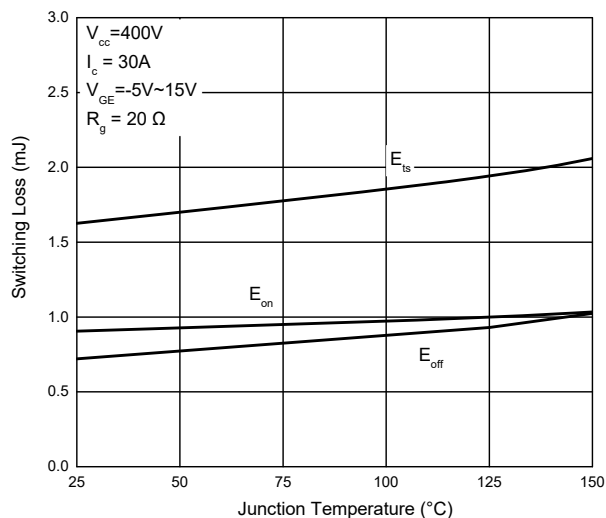


Fig. 8 - Switching Loss vs. V_{CE}

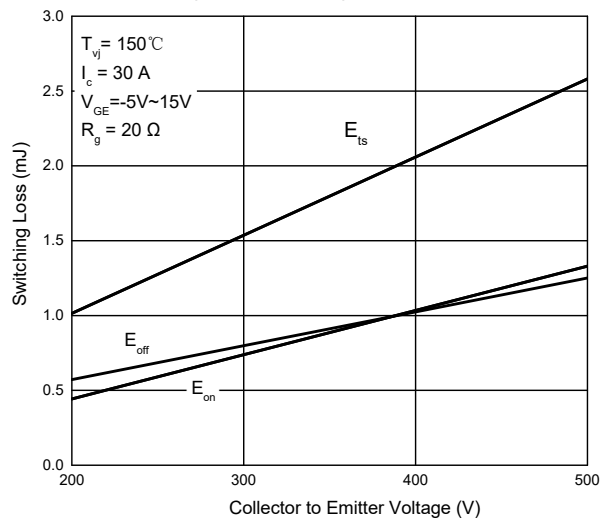


Fig. 9 - $V_{GE(th)}$ vs. Junction Temperature

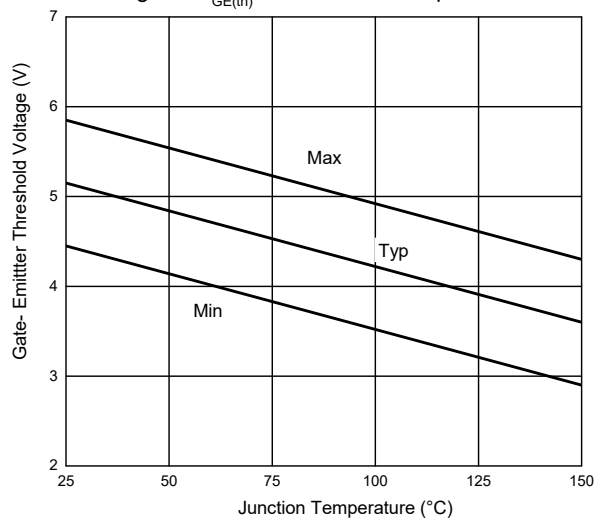


Fig. 10 - Switching Time vs. Collect Current

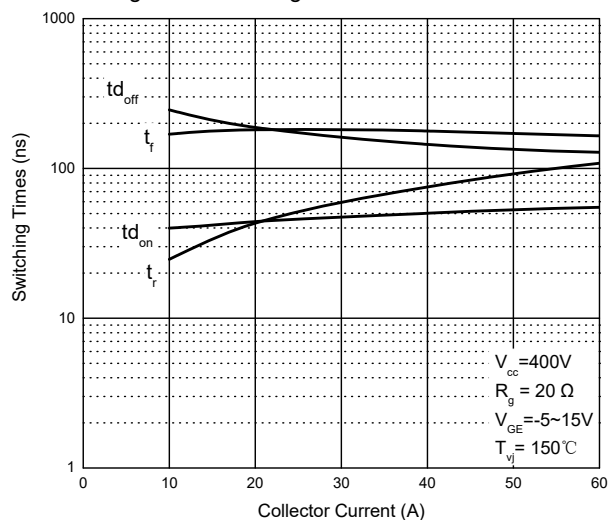


Fig. 11 - IGBT Transient Thermal Impedance

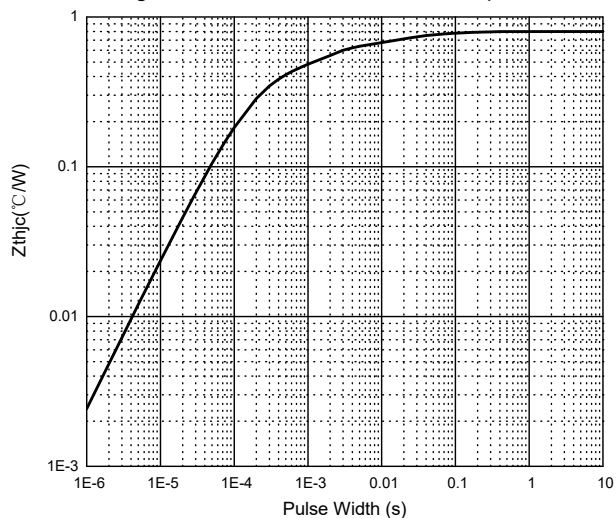
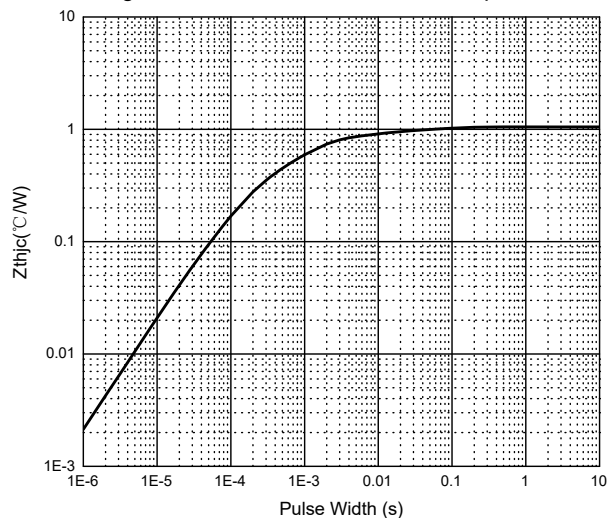


Fig. 12 - Diode Transient Thermal Impedance



Curve Characteristics

Fig. 13 - Collector Current vs. Case Temperature

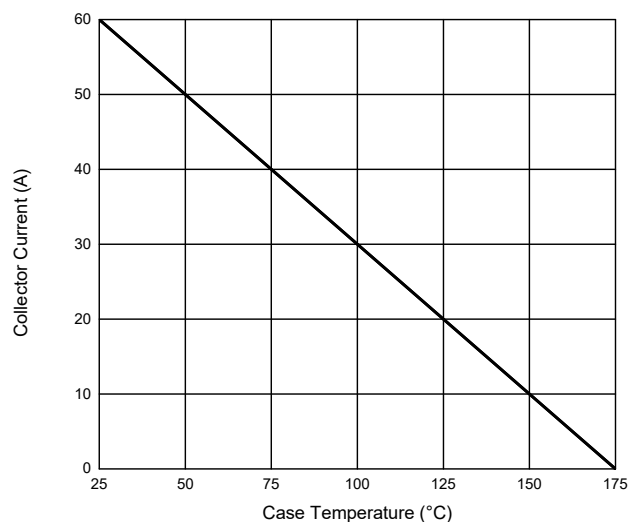
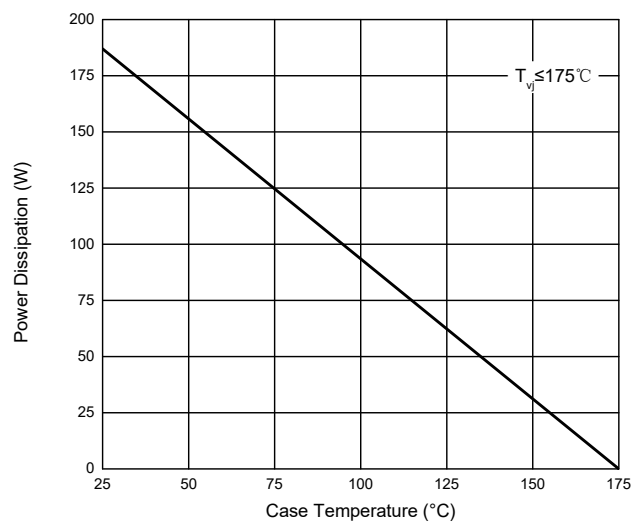


Fig. 14 - Power Derating



Ordering Information

Device	Packing
Part Number-BP	Tube: 30pcs/Tube, 1800pcs/Ctn

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