

Automotive N-Channel 60 V (D-S) 175 °C MOSFET

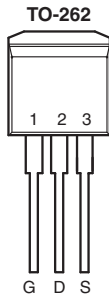
 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE

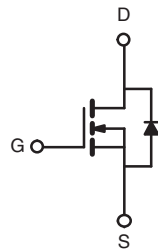
PRODUCT SUMMARY	
V_{DS} (V)	60
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.005
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.007
I_D (A)	90
Configuration	Single

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- AEC-Q101 Qualified^d
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



Top View



N-Channel MOSFET

ORDERING INFORMATION	
Package	TO-262
Lead (Pb)-free and Halogen-free	SQV90N06-05-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V_{DS}	60	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ^a	I_D	$T_C = 25$ °C	120	
		$T_C = 125$ °C	94	
Continuous Source Current (Diode Conduction) ^a	I_S	120	A	
Pulsed Drain Current ^b	I_{DM}	480		
Single Pulse Avalanche Current	I_{AS}	75		
Single Pulse Avalanche Energy	E_{AS}	L = 0.1 mH	280	mJ
Maximum Power Dissipation ^b			$T_C = 25$ °C	
		$T_C = 125$ °C	83	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 175	°C	

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	R_{thJA}	40	°C/W
Junction-to-Case (Drain)			

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.



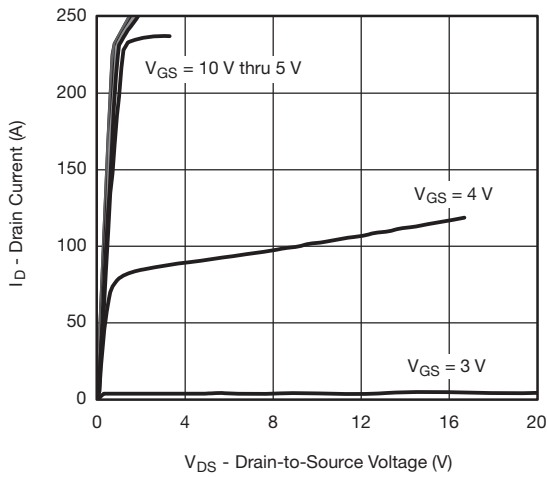
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	60	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.5	2.0	2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 60 V	-	-	1	μA
		V _{GS} = 0 V, V _{DS} = 60 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V, V _{DS} = 60 V, T _J = 175 °C	-	-	250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V, V _{DS} ≥ 5 V	120	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 30 A	-	0.003	0.005	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C	-	-	0.008	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C	-	-	0.0095	
		V _{GS} = 4.5 V, I _D = 30 A	-	0.004	0.007	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 30 A	-	110	-	S
Dynamic^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz	-	7190	8990	pF
Output Capacitance	C _{oss}		-	830	1035	
Reverse Transfer Capacitance	C _{rss}		-	580	725	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V, V _{DS} = 30 V, I _D = 90 A	-	175	210	nC
Gate-Source Charge ^c	Q _{gs}		-	35	42	
Gate-Drain Charge ^c	Q _{gd}		-	34	44	
Gate Resistance	R _g	f = 1 MHz	0.5	1.7	2.8	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.33 Ω I _D = 90 A, V _{GEN} = 10 V, R _g = 2.5 Ω	-	18	27	ns
Rise Time ^c	t _r		-	18	27	
Turn-Off Delay Time ^c	t _{d(off)}		-	84	126	
Fall Time ^c	t _f		-	28	42	
Source-Drain Diode Ratings and Characteristics^b						
Pulsed Current ^a	I _{SM}		-	-	480	A
Forward Voltage	V _{SD}	I _F = 90 A, V _{GS} = 0 V	-	1.1	1.4	V

Notes

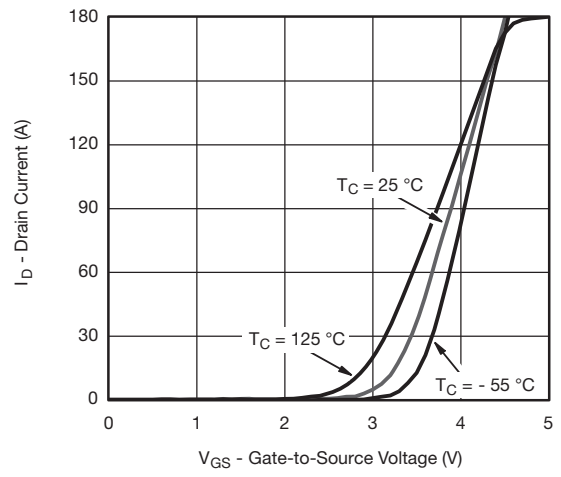
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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.

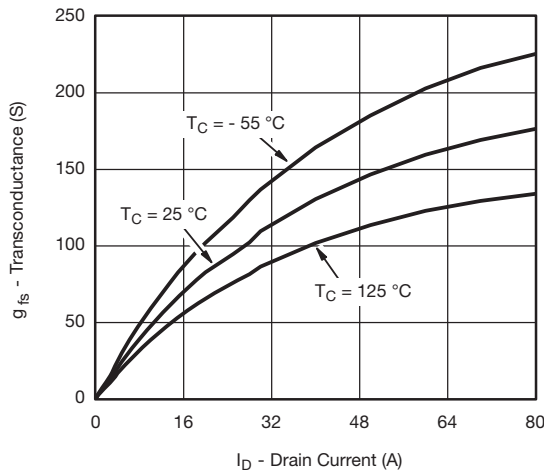
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



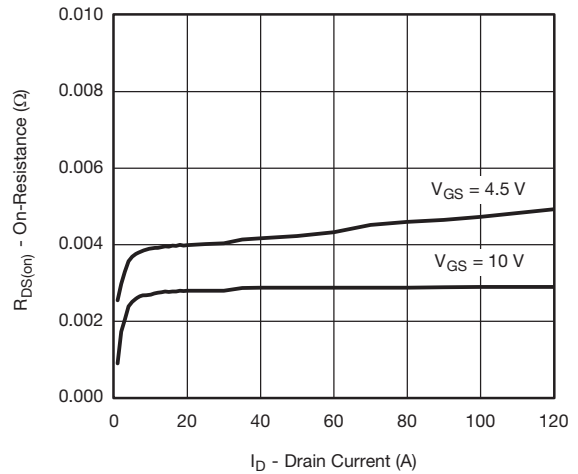
Output Characteristics



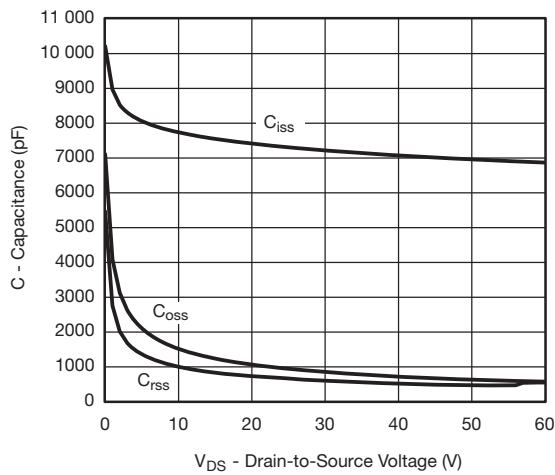
Transfer Characteristics



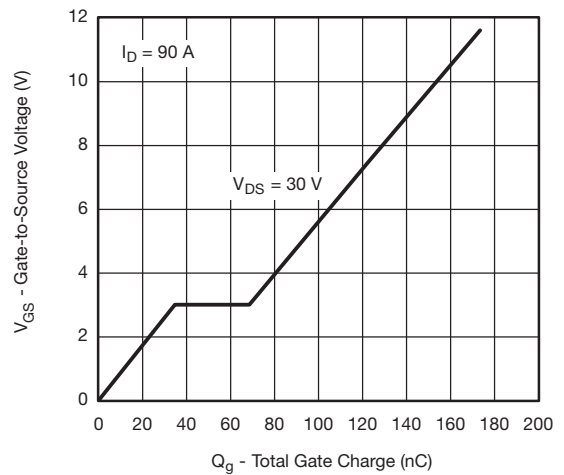
Transconductance



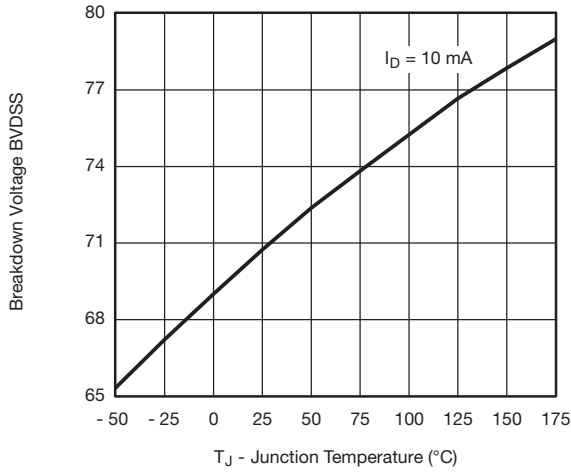
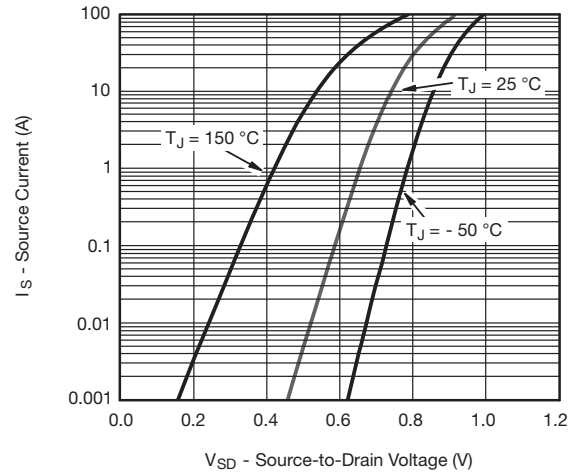
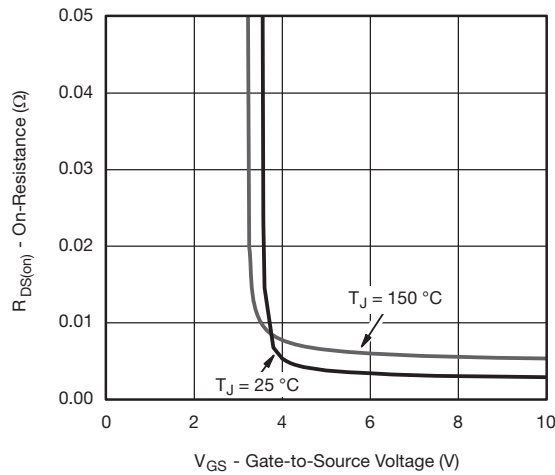
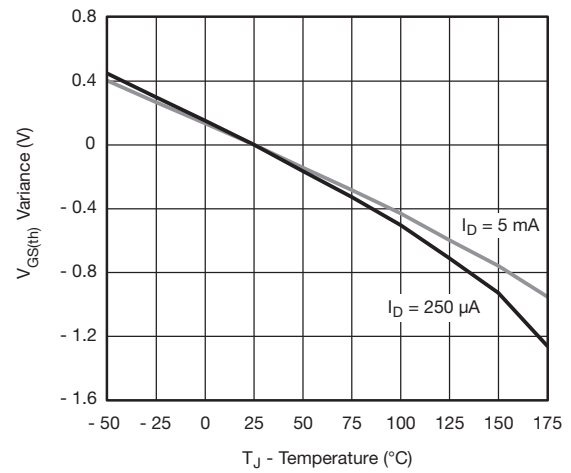
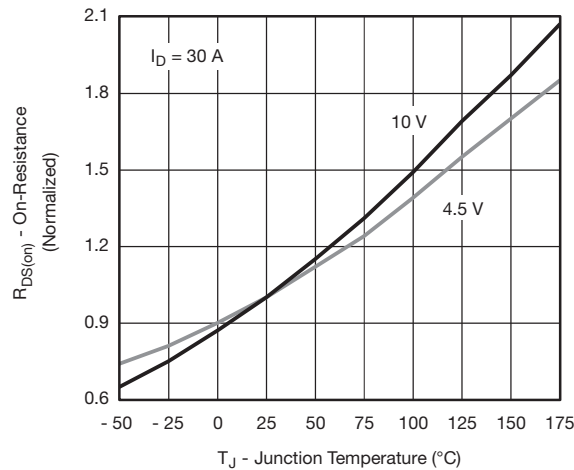
On-Resistance vs. Drain Current



Capacitance

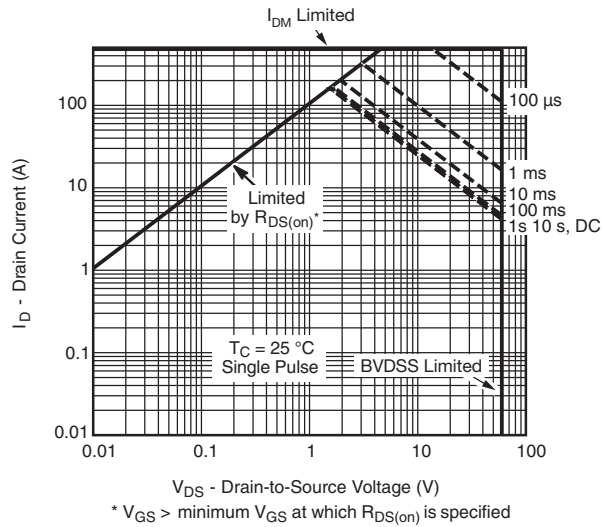


Gate Charge

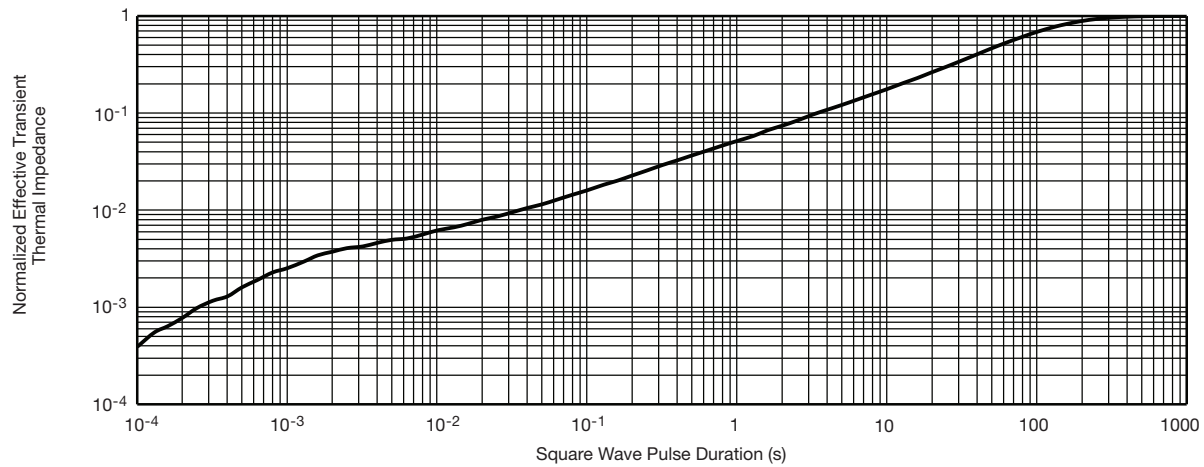
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

BVDS vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

On-Resistance vs. Junction Temperature



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



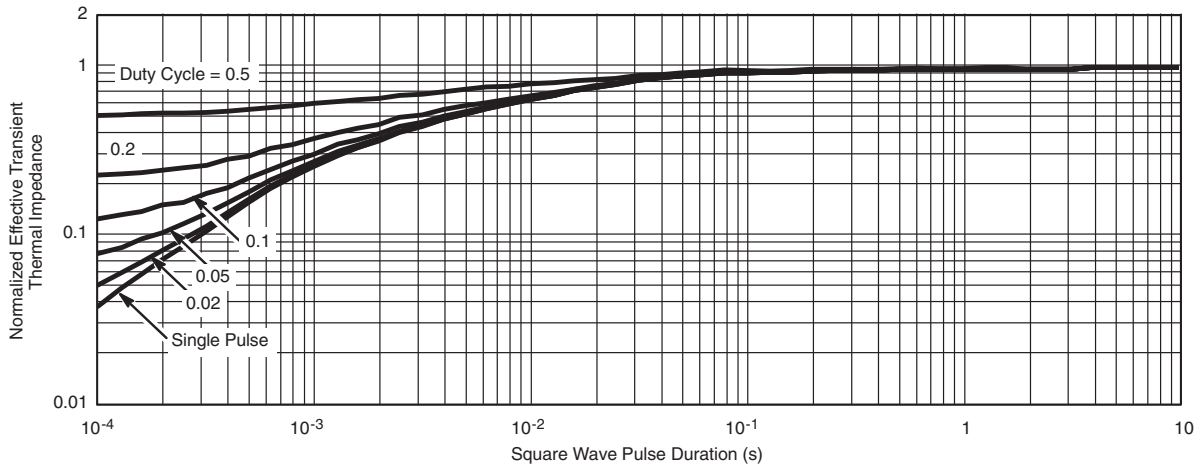
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



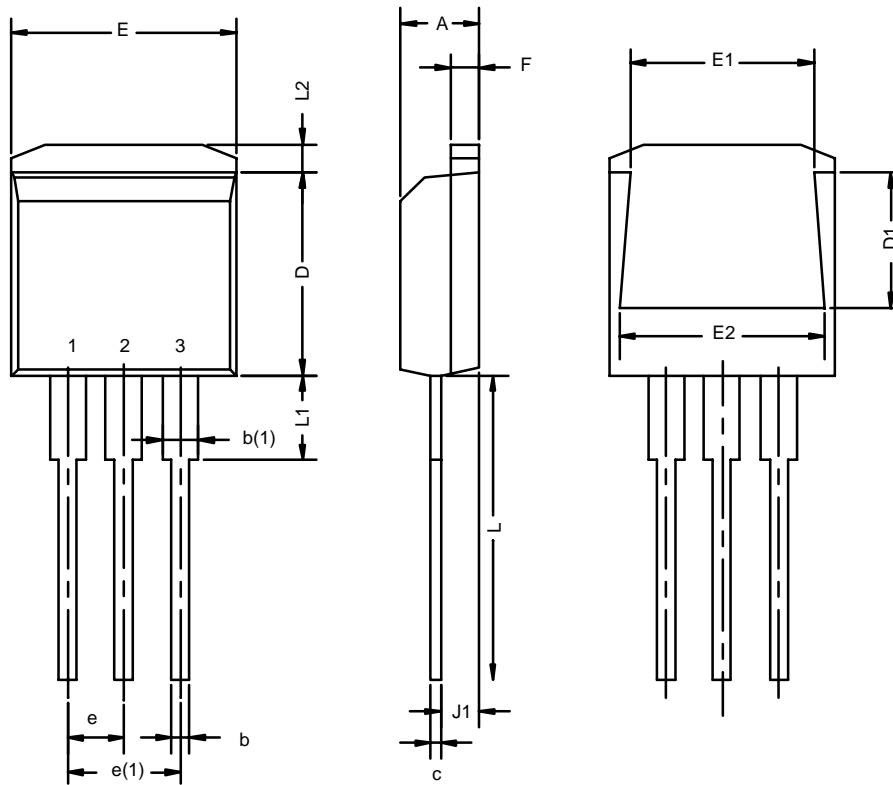
Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction to Case (25 °C)
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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TO-262: 3-LEAD



Dim	MILLIMETERS*		INCHES	
	Min	Max	Min	Max
A	4.32	4.70	0.170	0.185
b	0.64	1.00	0.025	0.039
b(1)	1.14	1.40	0.045	0.055
c	0.36	0.50	0.014	0.020
D	8.64	9.65	0.340	0.380
D1	5.59	6.10	0.220	0.240
e	2.41	2.67	0.095	0.105
e(1)	4.95	5.33	0.195	0.210
E	10.03	10.41	0.395	0.410
E1	7.87	8.64	0.310	0.340
E2	9.02	9.53	0.355	0.375
F	1.14	1.40	0.045	0.055
J1	2.41	2.79	0.095	0.110
L	13.08	14.22	0.515	0.560
L1	-	3.81	-	0.150
L2	1.02	1.40	0.040	0.055

ECN: T-02234—Rev. C, 14-Oct-02
DWG: 5855

*Use millimeters as the primary measurement



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