

FAN1117A

1A Adjustable/Fixed Low Dropout Linear Regulator

Features

- Low dropout voltage
- Load regulation: 0.05% typical
- Trimmed current limit
- On-chip thermal limiting
- Standard SOT-223, TO-263, and TO-252 packages
- Three-terminal adjustable or fixed 2.5V, 2.85V, 3.3V, 5V

Applications

- Active SCSI terminators
- High efficiency linear regulators
- Post regulators for switching supplies
- Battery chargers
- 12V to 5V linear regulators
- Motherboard clock supplies

Description

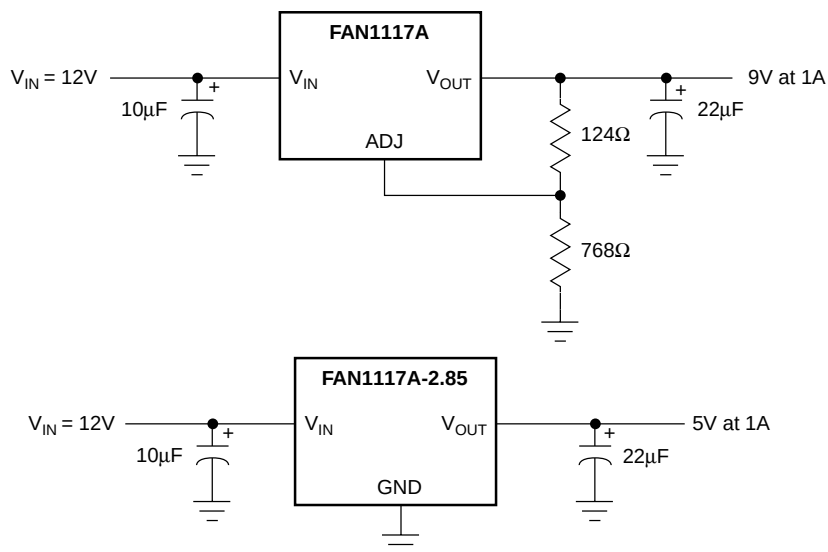
The FAN1117A and FAN1117A-2.5, -2.85, -3.3 and -5 are low dropout three-terminal regulators with 1A output current capability. These devices have been optimized for low voltage where transient response and minimum input voltage are critical. The 2.85V version is designed specifically to be used in Active Terminators for SCSI bus.

Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal limiting provides protection against any combination of overload and ambient temperatures that would create excessive junction temperatures.

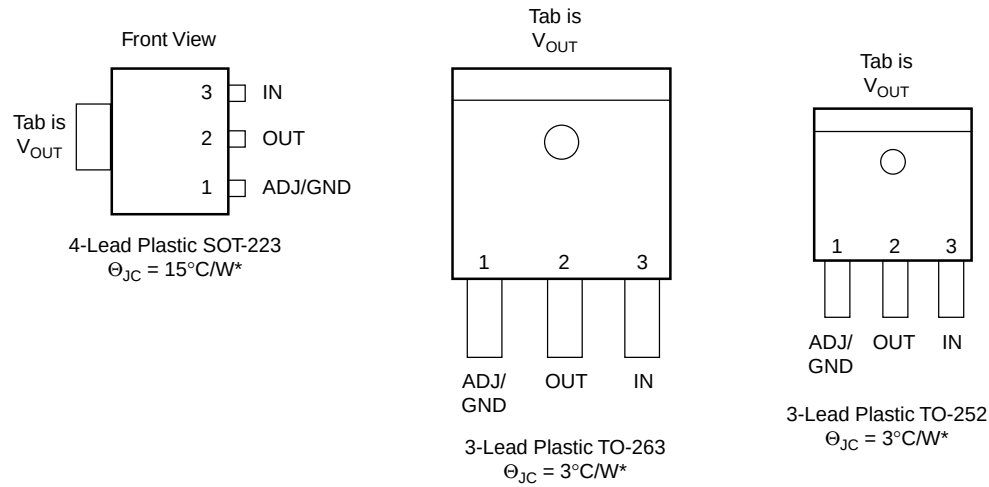
Unlike PNP type regulators where up to 10% of the output current is wasted as quiescent current, the quiescent current of the FAN1117A flows into the load, increasing efficiency.

The FAN1117A series regulators are available in the industry-standard SOT-223, TO-263 (D2PAK) and TO-252 (DPAK) power packages.

Typical Applications



Pin Assignments



*With package soldered to 0.5 square inch copper area over backside ground plane or internal power plane., θ_{JA} can vary from 30°C/W to more than 50°C/W . Other mounting techniques may provide better thermal resistance than 30°C/W .

Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
V_{IN}		13.2	V
$(V_{IN} - V_{OUT}) * I_{OUT}$		See Figure 1	
Operating Junction Temperature Range	0	125	$^{\circ}\text{C}$
Storage Temperature Range	-65	150	$^{\circ}\text{C}$
Lead Temperature (Soldering, 10 sec.)		300	$^{\circ}\text{C}$

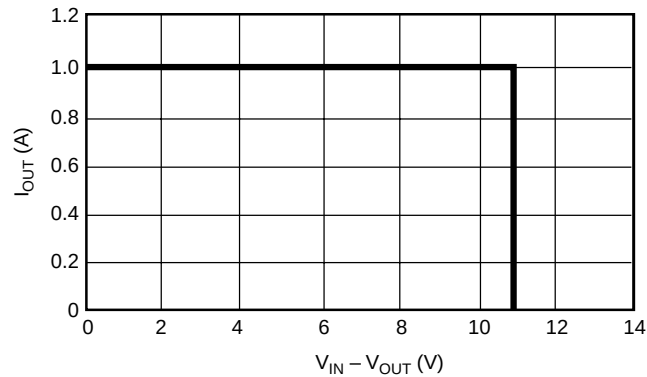


Figure 1. Absolute Maximum Safe Operating Area

Electrical Characteristics

Operating Conditions: $V_{IN} \leq 7V$, $T_J = 25^\circ C$ unless otherwise specified.

The • denotes specifications which apply over the specified operating temperature range.

Parameter	Conditions	Min.	Typ.	Max.	Units
Reference Voltage ³	$1.5V \leq (V_{IN} - V_{OUT}) \leq 5.75V$, $10mA \leq I_{OUT} \leq 1A$	• 1.225 (-2%)	1.250	1.275 (+2%)	V
Output Voltage ⁴	$10mA \leq I_{OUT} \leq 1A$ FAN1117A-2.5, $4V \leq V_{IN} \leq 12V$ FAN1117A-2.85, $4.35V \leq V_{IN} \leq 12V$ FAN1117A-3.3, $4.8V \leq V_{IN} \leq 12V$ FAN1117A-5, $6.5V \leq V_{IN} \leq 12V$	• 2.450 • 2.793 • 3.234 • 4.900	2.5 2.85 3.3 5.0	2.550 2.907 3.366 5.100	V V V V
Line Regulation ^{1,2}	$(V_{OUT} + 1.5V) \leq V_{IN} \leq 12V$, $I_{OUT} = 10mA$	•	0.005	0.2	%
Load Regulation ^{1,2}	$(V_{IN} - V_{OUT}) = 2V$, $10mA \leq I_{OUT} \leq 1A$	•	0.05	0.5	%
Dropout Voltage	$\Delta V_{REF} = 1\%$, $I_{OUT} = 1A$	•	1.100	1.200	V
Current Limit	$(V_{IN} - V_{OUT}) = 2V$	• 1.1	1.5		A
Adjust Pin Current ³		•	35	120	μA
Adjust Pin Current Change ^{3,4}	$1.5V \leq (V_{IN} - V_{OUT}) \leq 12V$, $10mA \leq I_{OUT} \leq 1A$	•	0.2	5	μA
Minimum Load Current	$1.5V \leq (V_{IN} - V_{OUT}) \leq 12V$	• 10			mA
Quiescent Current	$V_{IN} = V_{OUT} + 1.25V$	•	4	13	mA
Ripple Rejection	$f = 120Hz$, $C_{OUT} = 22\mu F$ Tantalum, $(V_{IN} - V_{OUT}) = 3V$, $I_{OUT} = 1A$		60	72	dB
Thermal Regulation	$T_A = 25^\circ C$, 30ms pulse		0.004	0.02	%/W
Temperature Stability		•	0.5		%
Long-Term Stability	$T_A = 125^\circ C$, 1000hrs.		0.03	1.0	%
RMS Output Noise (% of V_{OUT})	$T_A = 25^\circ C$, $10Hz \leq f \leq 10kHz$		0.003		%
Thermal Resistance, Junction to Case	SOT-223		15		$^\circ C/W$
	TO-263, TO-252		3		$^\circ C/W$
Thermal Shutdown	Junction Temperature		155		$^\circ C$
Thermal Shutdown Hysteresis			10		$^\circ C$

Notes:

- See thermal regulation specifications for changes in output voltage due to heating effects. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
- Line and load regulation are guaranteed up to the maximum power dissipation (18W). Power dissipation is determined by input/output differential and the output current. Guaranteed maximum output power will not be available over the full input/output voltage range.
- FAN1117A only.
- Output current must be limited to meet the absolute maximum ratings of the part.

Typical Performance Characteristics

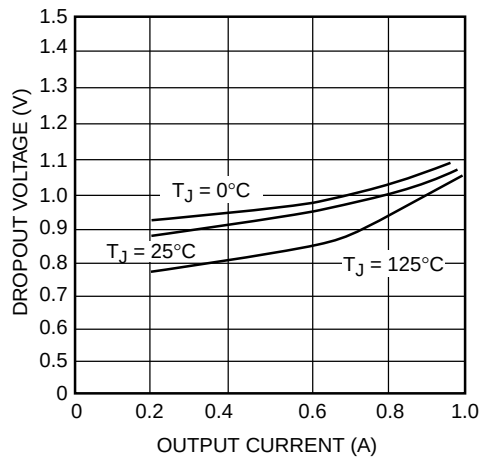


Figure 2. Dropout Voltage vs. Output Current

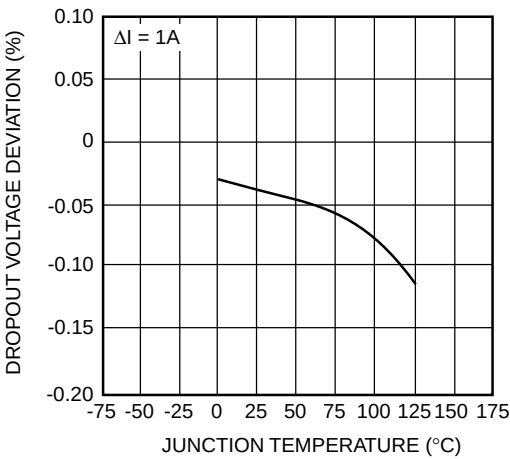


Figure 3. Load Regulation vs. Temperature

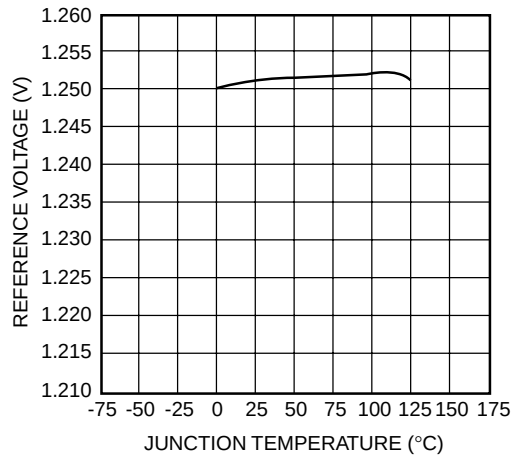


Figure 4. Reference Voltage vs. Temperature

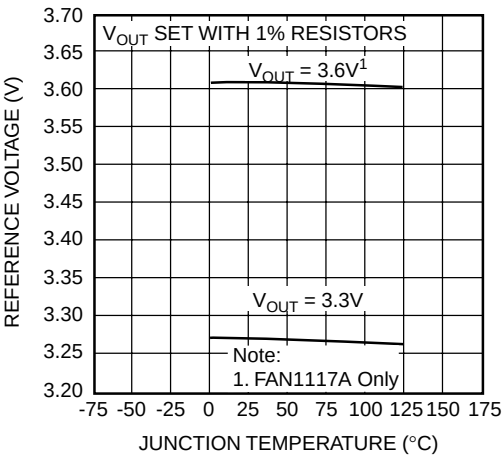


Figure 5. Output Voltage vs. Temperature

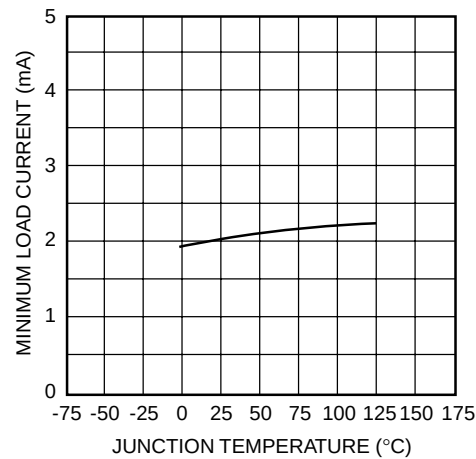


Figure 6. Minimum Load Current vs. Temperature

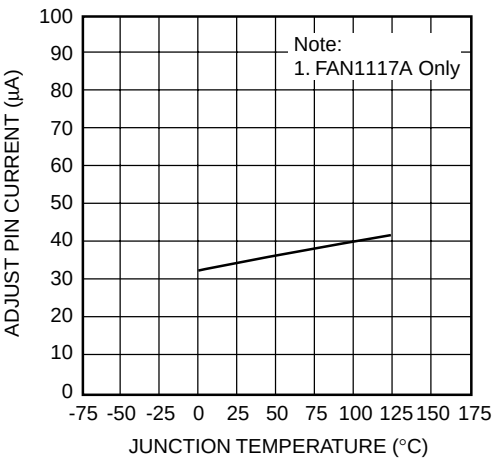


Figure 7. Adjust Pin Current vs. Temperature

Typical Performance Characteristics (continued)

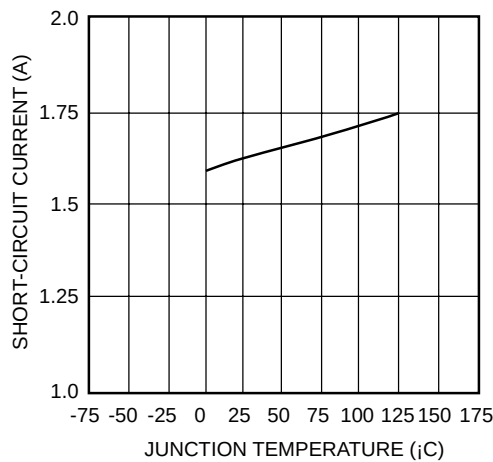


Figure 8. Short-Circuit Current vs. Temperature

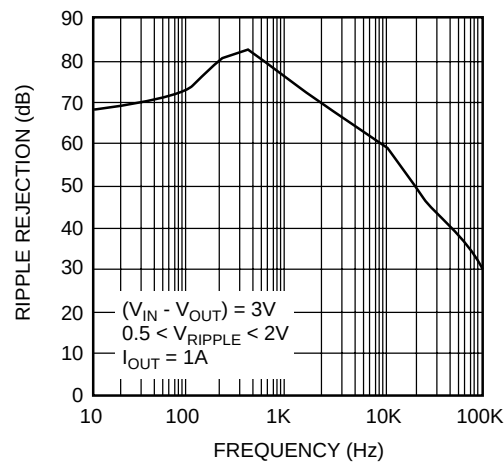


Figure 9. Ripple Rejection vs. Frequency

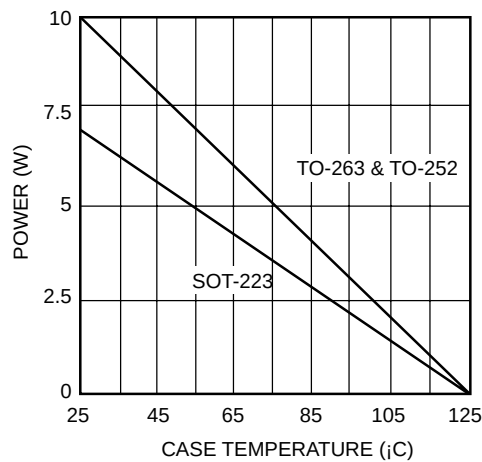


Figure 10. Maximum Power Dissipation

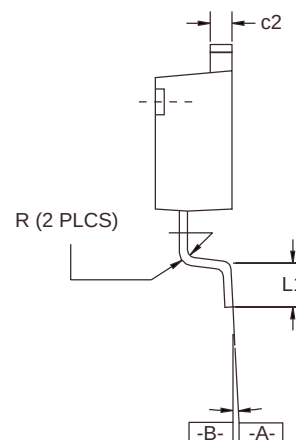
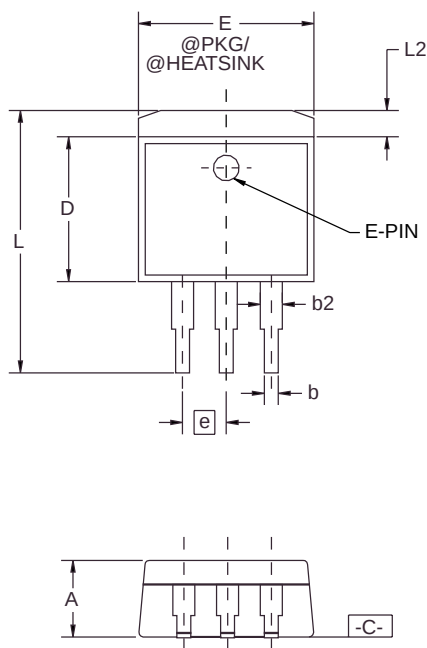
Mechanical Dimensions

3-Lead TO-263 Package

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.160	.190	4.06	4.83	
b	.020	.036	0.51	0.91	
b2	.049	.051	1.25	1.30	
c2	.045	.055	1.14	1.40	
D	.340	.380	8.64	9.65	
E	.380	.405	9.65	10.29	
e	.100 BSC		2.54 BSC		
L	.575	.625	14.61	15.88	
L1	.090	.110	2.29	2.79	
L2	—	.055	—	1.40	
R	.017	.019	0.43	0.78	
α	0°	8°	0°	8°	

Notes:

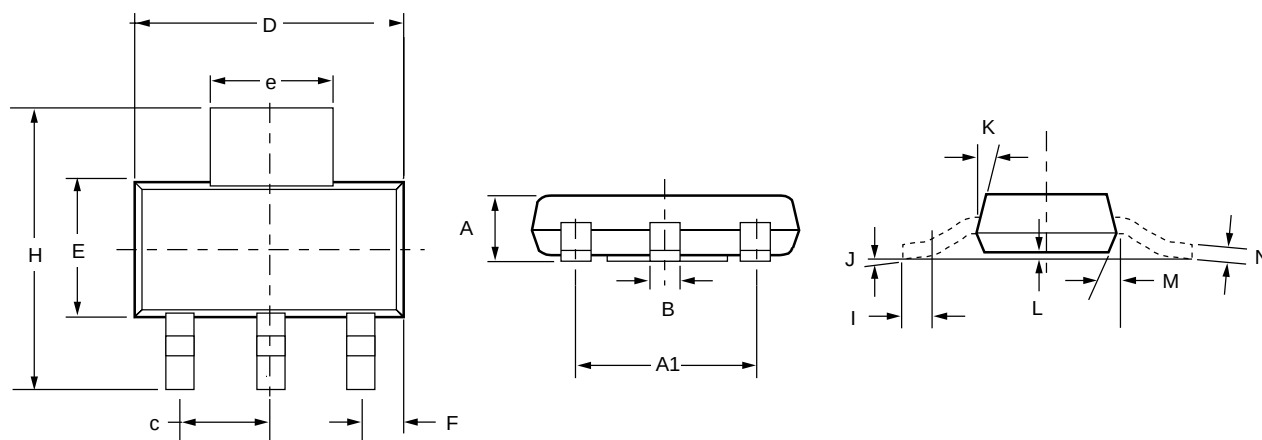
1. Dimensions are exclusive of mold flash and metal burrs.
2. Standoff-height is measured from lead tip with ref. to Datum -B-.
3. Foot length is measured with ref. to Datum -A- with lead surface (at inner R).
4. Dimension exclusive of dambar protrusion or intrusion.
5. Formed leads to be planar with respect to one another at seating place -C-.



Mechanical Dimensions

4-Lead SOT-223 Package

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	—	.071	—	1.80	
A1	—	.181	—	4.80	
B	.025	.033	.640	.840	
c	—	.090	—	2.29	
D	.248	.264	6.30	6.71	
E	.130	.148	3.30	3.71	
e	.115	.124	2.95	3.15	
F	.033	.041	.840	1.04	
H	.264	.287	6.71	7.29	
I	.012	—	.310	—	
J	—	10°	—	10°	
K	10°	16°	10°	16°	
L	.0008	.0040	.0203	.1018	
M	10°	16°	10°	16°	
N	.010	.014	.250	.360	



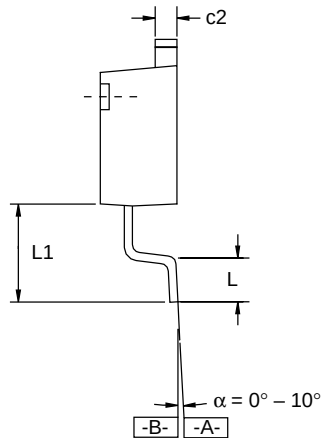
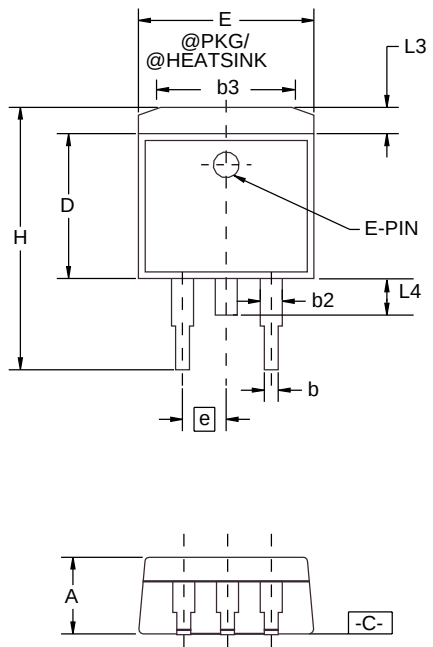
Mechanical Dimensions

3-Lead TO-252 Package

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.086	.094	2.19	2.39	
b	.025	.035	0.64	0.89	
b2	.030	.045	0.76	1.14	
b3	.205	.215	5.21	5.46	4
c	.018	.024	0.46	0.61	
c2	.018	.023	0.46	0.58	
D	.210	.245	5.33	6.22	1
E	.250	.265	6.35	6.73	1
e	.090 BSC		2.29 BSC		
H	.370	.410	9.40	10.41	
L	.055	.070	1.40	1.78	3
L1	.108 REF		2.74 REF		
L3	.035	.080	0.89	2.03	4
L4	.025	.040	0.64	1.02	

Notes:

1. Dimensions are exclusive of mold flash, metal burrs or interlead protrusion.
2. Stand off-height is measured from lead tip with ref. to Datum -B-.
3. Foot length is measured with ref. to Datum -A- with lead surface.
4. Thermal pad contour optional within dimension b3 and L3.
5. Formed leads to be planar with respect to one another at seating place -C-.
6. Dimensions and tolerances per ASME Y14.5M-1994.



Ordering Information

Product Number	Package
FAN1117AD	TO-252
FAN1117AM	TO-263
FAN1117AS	SOT-223
FAN1117AD-2.5	TO-252
FAN1117AM-2.5	TO-263
FAN1117AS-2.5	SOT-223
FAN1117AD-2.85	TO-252
FAN1117AM-2.85	TO-263
FAN1117AS-2.85	SOT-223
FAN1117AD-3.3	TO-252
FAN1117AM-3.3	TO-263
FAN1117AS-3.3	SOT-223
FAN1117AD-5	TO-252
FAN1117AM-5	TO-263
FAN1117AS-5	SOT-223

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.