



**KERSEMI**

**TS420 Series**

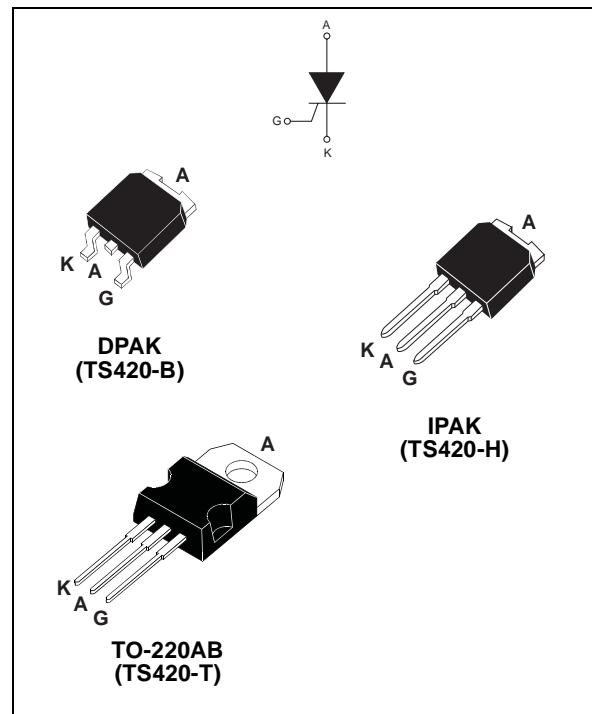
**4A SCRs**

#### MAIN FEATURES:

Symbol	Value	Unit
$I_{T(RMS)}$	4	A
$V_{DRM}/V_{RRM}$	600 and 700	V
$I_{GT}$	200	$\mu A$

#### DESCRIPTION

Thanks to highly sensitive triggering levels, the TS420 series is suitable for all applications where the available gate current is limited, such as motor control for hand tools, kitchen aids, overvoltage crowbar protection for low power supplies, ... Available in through-hole or surface-mount packages, they provide an optimized performance in a limited space area.



#### ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	RMS on-state current (180° conduction angle)	$T_I = 115^\circ C$	4	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)	$T_I = 115^\circ C$	2.5	A
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 8.3 \text{ ms}$	33	A
		$t_p = 10 \text{ ms}$	30	
$I^2t$	$I^2t$ Value for fusing	$t_p = 10 \text{ ms}$	$T_j = 25^\circ C$	$A^2\text{s}$
$dl/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}, t_r \leq 100 \text{ ns}$	$F = 60 \text{ Hz}$	$T_j = 125^\circ C$	$A/\mu s$
$I_{GM}$	Peak gate current	$t_p = 20 \mu s$	$T_j = 125^\circ C$	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125^\circ C$	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range		- 40 to + 150 - 40 to + 125	$^\circ C$

## TS420 Series

### ELECTRICAL CHARACTERISTICS ( $T_j = 25^\circ\text{C}$ , unless otherwise specified)

Symbol	Test Conditions		TS420	Unit
$I_{GT}$	$V_D = 12 \text{ V}$	$R_L = 33 \Omega$	MAX.	200
$V_{GT}$			MAX.	0.8
$V_{GD}$	$V_D = V_{DRM}$	$R_L = 3.3 \text{ k}\Omega$	MIN.	0.1
$V_{RG}$	$I_{RG} = 10 \mu\text{A}$		MIN.	8
$I_H$	$I_T = 50 \text{ mA}$		MAX.	5
$I_L$	$I_G = 1 \text{ mA}$		MAX.	6
$dV/dt$	$V_D = 67 \% V_{DRM}$	$R_{GK} = 220 \Omega$	MIN.	5
$V_{TM}$	$I_{TM} = 8 \text{ A}$	$t_p = 380 \mu\text{s}$	$T_j = 25^\circ\text{C}$	MAX.
$V_{t0}$	Threshold voltage		$T_j = 125^\circ\text{C}$	MAX.
$R_d$	Dynamic resistance		$T_j = 125^\circ\text{C}$	MAX.
$I_{DRM}$	$V_{DRM} = V_{RRM}$	$R_{GK} = 220 \Omega$	$T_j = 25^\circ\text{C}$	MAX.
$I_{RRM}$			$T_j = 125^\circ\text{C}$	1

### THERMAL RESISTANCES

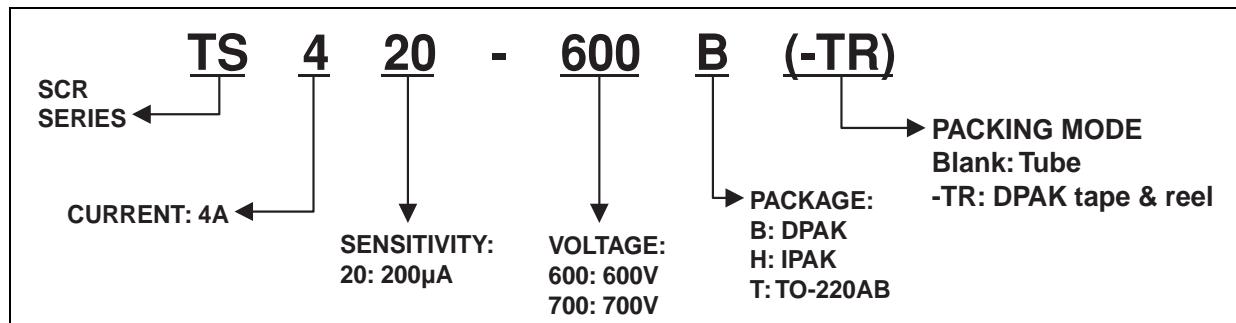
Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (DC)			3.0	$^\circ\text{C}/\text{W}$
$R_{th(j-a)}$	Junction to ambient (DC)	$S = 0.5 \text{ cm}^2$	DPAK	70	$^\circ\text{C}/\text{W}$
			IPAK	100	
			TO-220AB	60	

S = copper surface under tab

### PRODUCT SELECTOR

Part Number	Voltage (xxx)		Sensitivity	Package
	600 V	700 V		
TS420-xxxB	X	X	200 $\mu\text{A}$	DPAK
TS420-xxxH	X	X	200 $\mu\text{A}$	IPAK
TS420-xxxT	X	X	200 $\mu\text{A}$	TO-220AB

### ORDERING INFORMATION

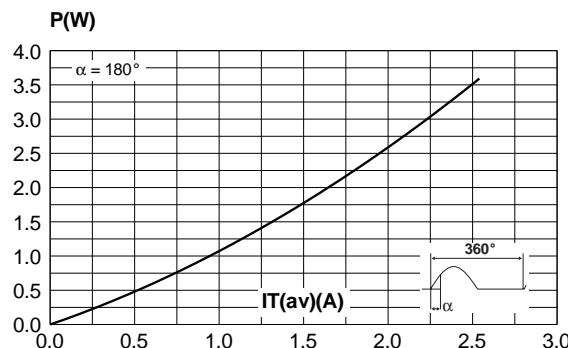


## OTHER INFORMATION

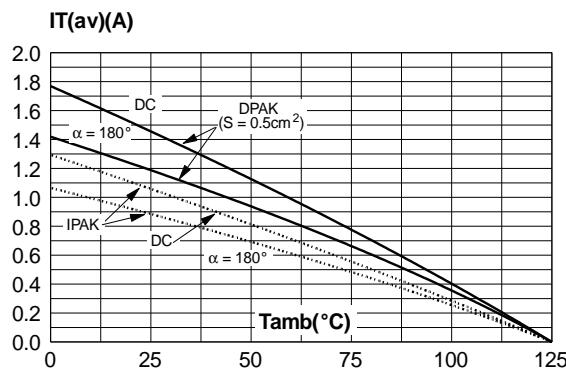
Part Number	Marking	Weight	Base Quantity	Packing mode
TS420-x00B	TS420x00	0.3 g	75	Tube
TS420-x00B-TR	TS420x00	0.3 g	2500	Tape & reel
TS420-x00H	TS420x00	0.4 g	75	Tube
TS420-x00T	TS420x00T	2.3 g	50	Tube

Note: x = voltage

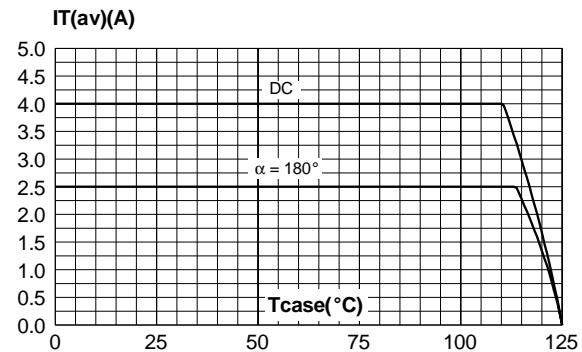
**Fig. 1:** Maximum average power dissipation versus average on-state current.



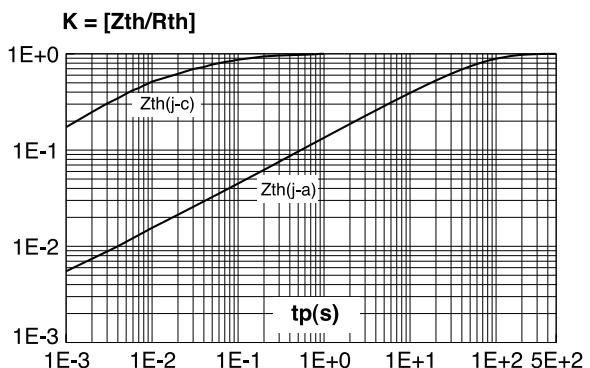
**Fig. 2-2:** Average and D.C. on-state current versus ambient temperature (device mounted on FR4 with recommended pad layout) (DPAK).



**Fig. 2-1:** Average and D.C. on-state current versus case temperature.

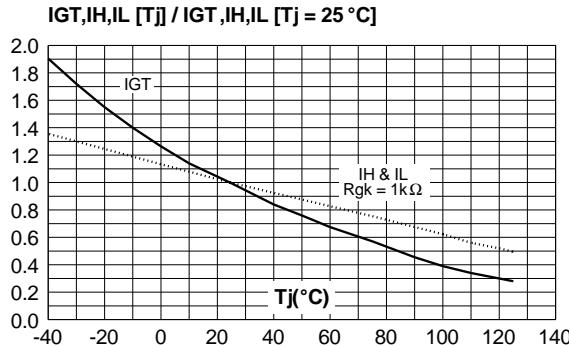


**Fig. 3:** Relative variation of thermal impedance junction to ambient versus pulse duration (recommended pad layout, FR4 PC board) for DPAK.

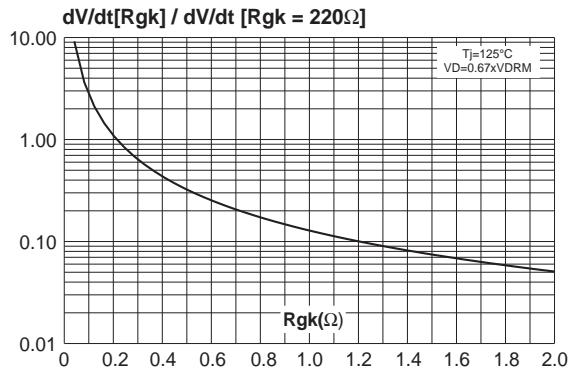


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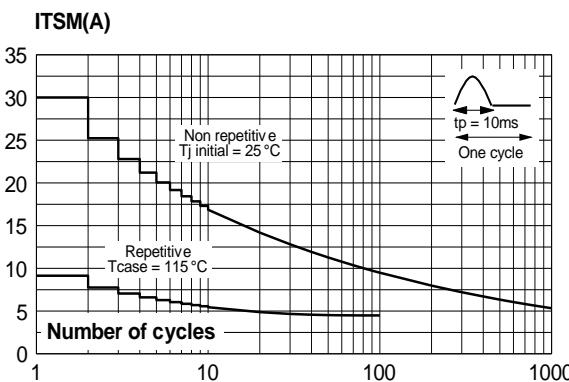
**Fig. 4:** Relative variation of gate trigger current and holding current versus junction temperature.



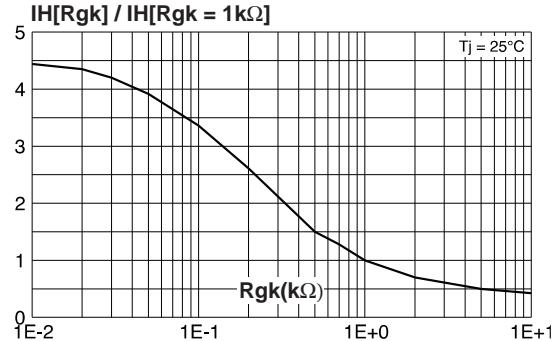
**Fig. 6:** Relative variation of dV/dt immunity versus gate-cathode resistance (typical values).



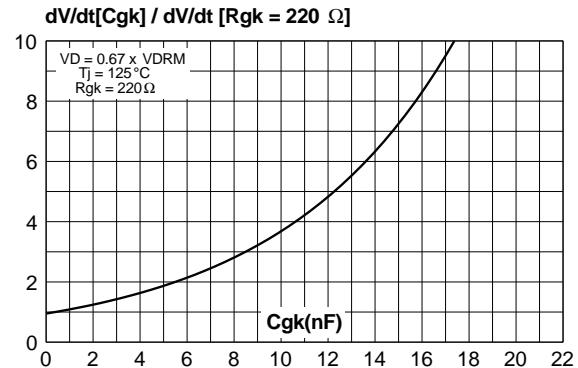
**Fig. 8:** Surge peak on-state current versus number of cycles.



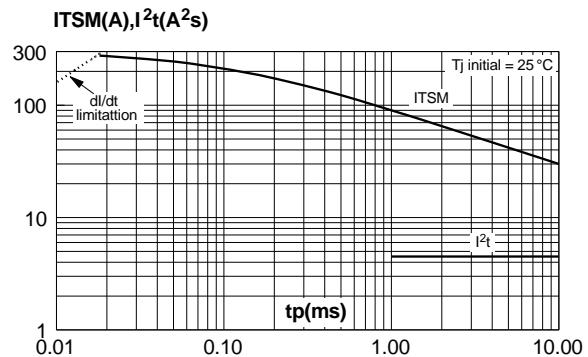
**Fig. 5:** Relative variation of holding current versus gate-cathode resistance (typical values).



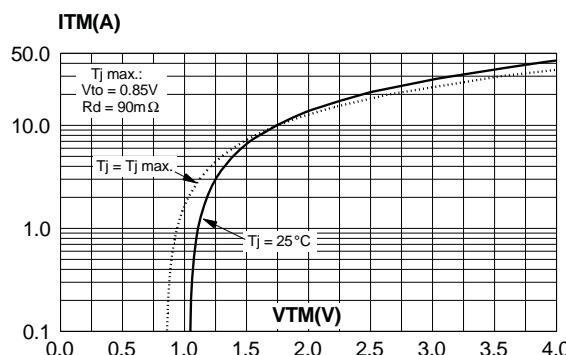
**Fig. 7:** Relative variation of dV/dt immunity versus gate-cathode resistance (typical values).



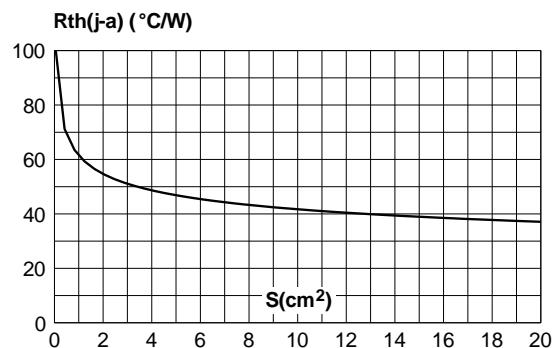
**Fig. 9:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $tp < 10$  ms, and corresponding values of  $I^2t$ .



**Fig. 10:** On-state characteristics (maximum values).



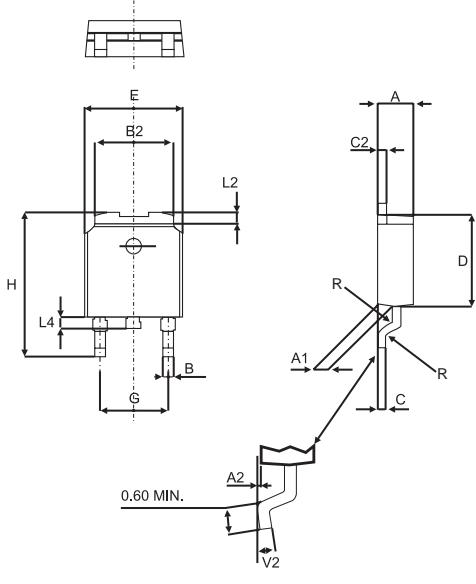
**Fig. 11:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35  $\mu m$ ) (DPAK).



## TS420 Series

### PACKAGE MECHANICAL DATA

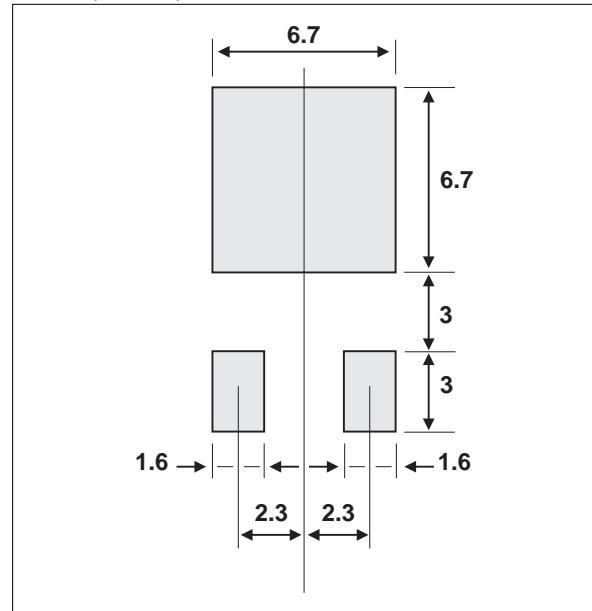
DPAK (Plastic)



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
R	0.2 typ.		0.007 typ.	
V2	0°	8°	0°	8°

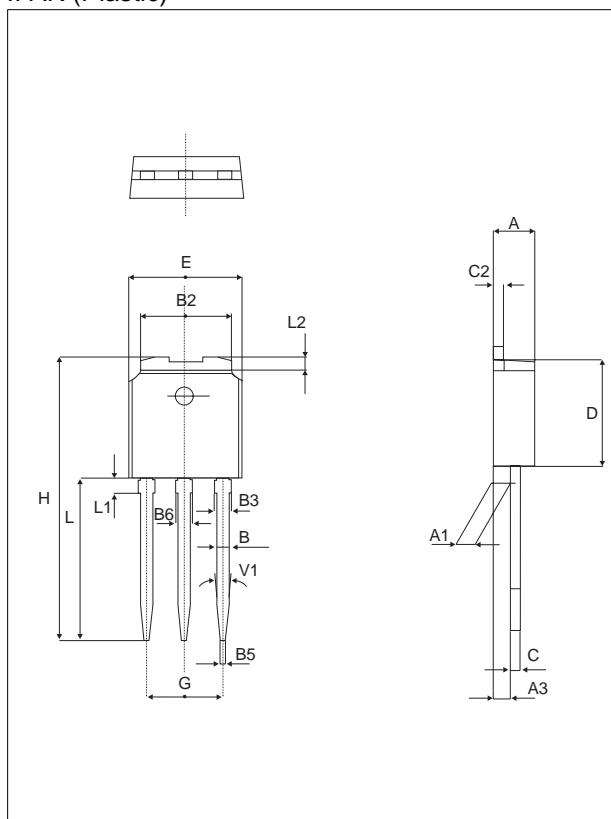
### FOOTPRINT DIMENSIONS (in millimeters)

DPAK (Plastic)



## PACKAGE MECHANICAL DATA

IPAK (Plastic)

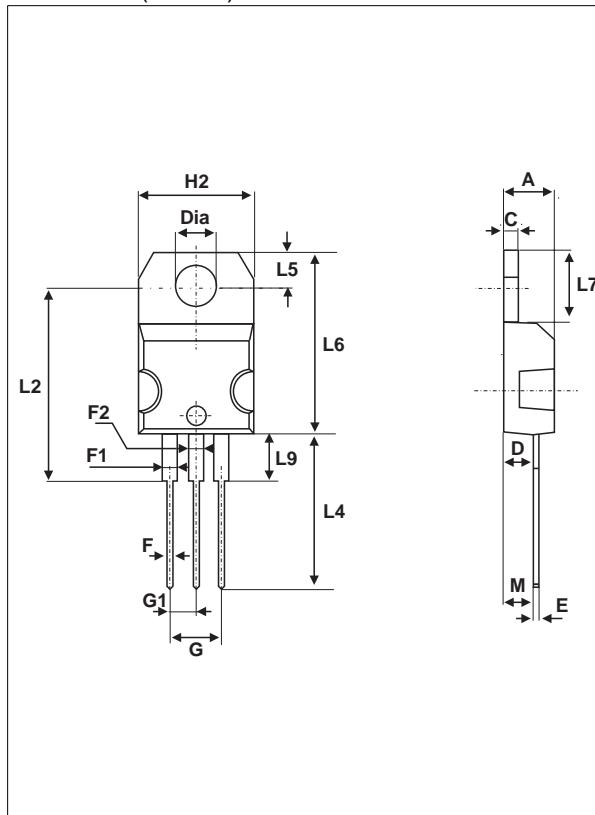


REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.035	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039
V1		10°			10°	

## TS420 Series

### PACKAGE MECHANICAL DATA

TO-220AB (Plastic)



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam.	3.75	3.85	0.147	0.151