

Description

The TFS050N03MG uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other switching application.

General Feature

$V_{DS} = 30V$, $I_D = 40A$

$R_{DS(ON) Typ} = 4.9m\Omega @ V_{GS}=10V$

$R_{DS(ON) Typ} = 6.9m\Omega @ V_{GS}=4.5V$

High Power and current handing cap

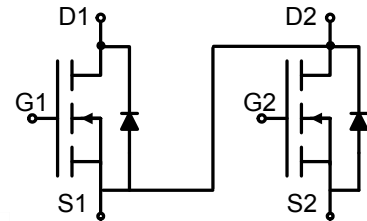
ability Lead free product is acquired

Surface mount package

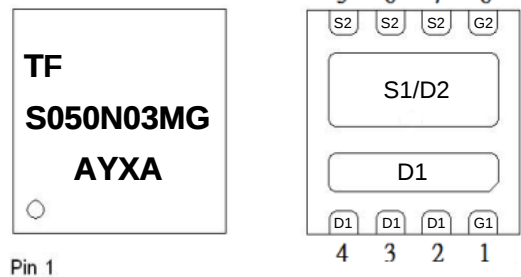
Application

Battery switch

DC/DC converter



Schematic diagram



DFN3030-8L

●Package Marking and Ordering Information:

Part NO.	TFS050N03MG
Marking1	S050N03MG: TFS050N03MG
Marking2	TF:tuofeng; Y:year code; X:Week; AA:device code;
Basic ordering unit (pcs)	5000

●Absolute Maximum Ratings ($T_C = 25^\circ C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@TC=25^\circ C}$	40	A
	$I_{D@TC=75^\circ C}$	30	A
	$I_{D@TC=100^\circ C}$	25	A
Pulsed Drain Current ^①	I_{DM}	115	A
Total Power Dissipation	$P_{D@TC=25^\circ C}$	30	W
Total Power Dissipation	$P_{D@TA=25^\circ C}$	1.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	40	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	4.6	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	57	° C/W
Soldering temperature, wavesoldering for 8 s	T_{sold}	-	-	265	° C

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.1	1.5	2.1	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$	-	4.9	6.5	m Ω
		$V_{GS}=4.5V, I_D=8.0A$	-	6.9	9.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=25V, I_D=10A$	-	15	-	S
Source-drain voltage	V_{SD}	$I_S=10A$	-	0.82	1.20	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$f = 1MHz$ $V_{DS}=15V$ $V_{GS}=0V$	-	750	-	pF
Output capacitance	C_{oss}		-	333	-	
Reverse transfer capacitance	C_{rss}		-	32.0	-	

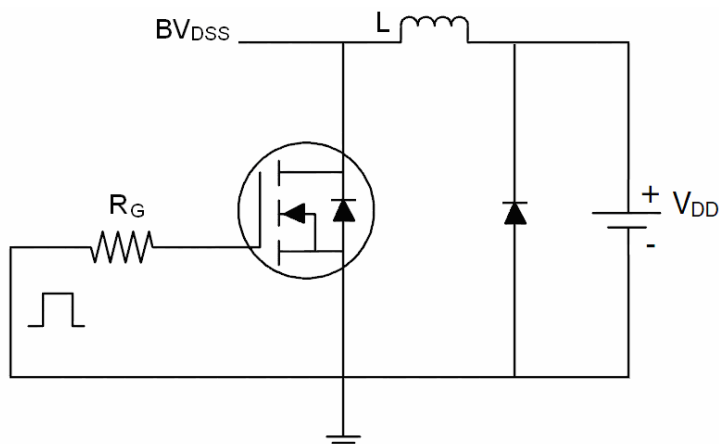
●Switching Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Turn-on delay time	$t_{d(on)}$	$V_{DD}=15V$ $I_D=10A$ $R_G=3.0\Omega$ $V_{GS}=10V$	-	4.3	-	nS
Rise time	t_r		-	23.0	-	
Turn-off delay time	$t_{d(off)}$		-	12.5	-	
Fall time	t_f		-	6.0	-	
Total gate charge	Q_g	$V_{DD}=15V$ $I_D=10A$ $V_{GS}=10V$	-	13.8	-	nC
Gate - Source charge	Q_{gs}		-	2.22	-	
Gate - Drain charge	Q_{gd}		-	3.23	-	

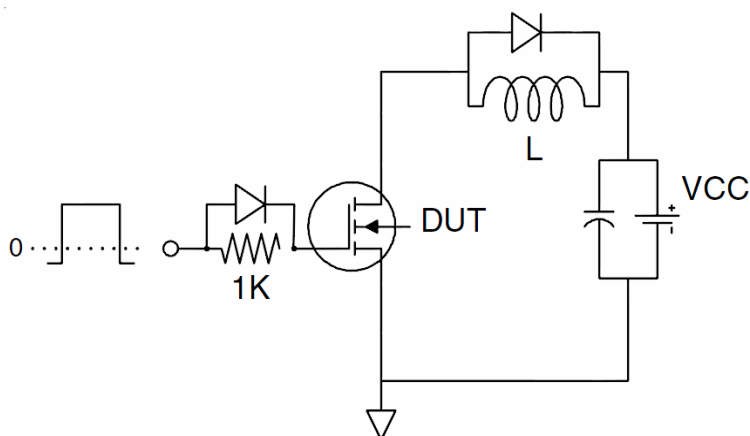
Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Test Circuit

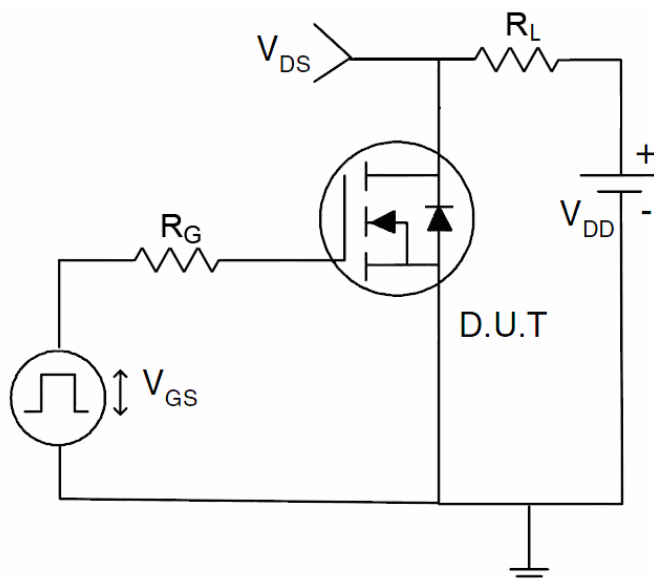
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

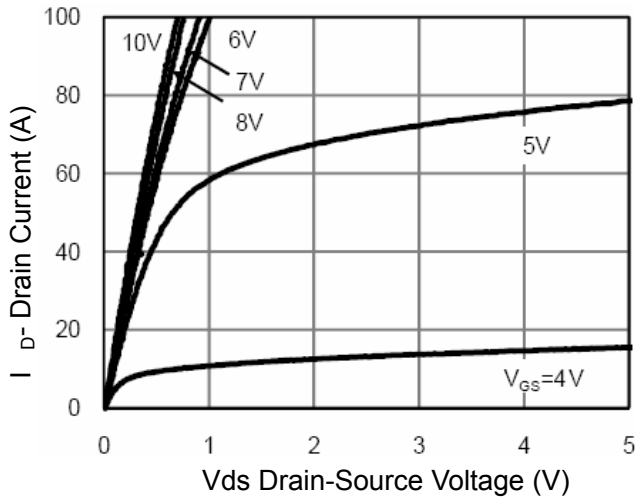


Figure 1 Output Characteristics

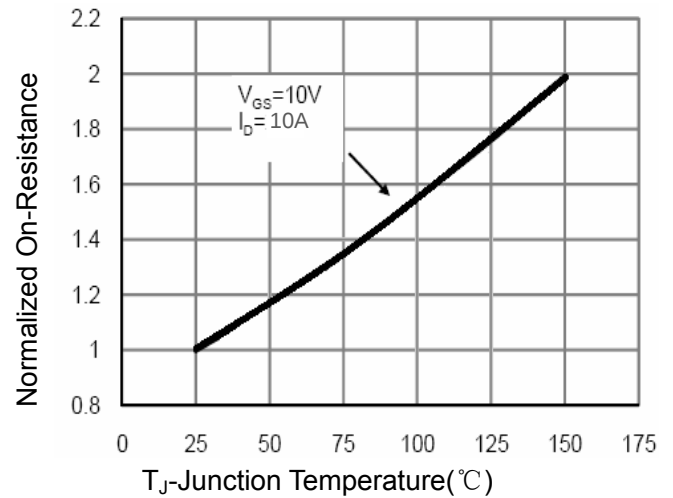


Figure 4 Rdson-Junction Temperature

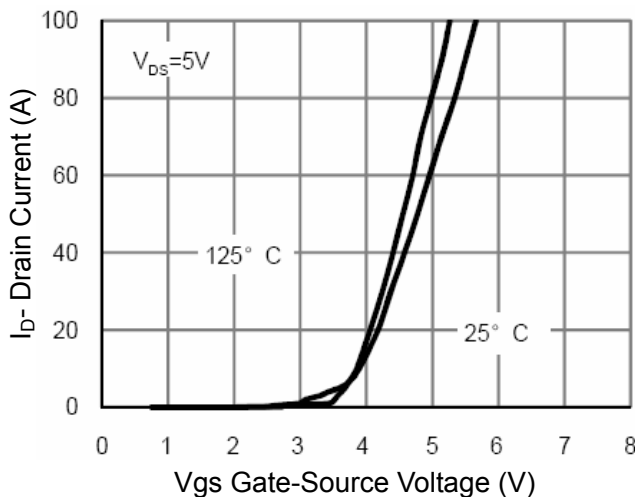


Figure 2 Transfer Characteristics

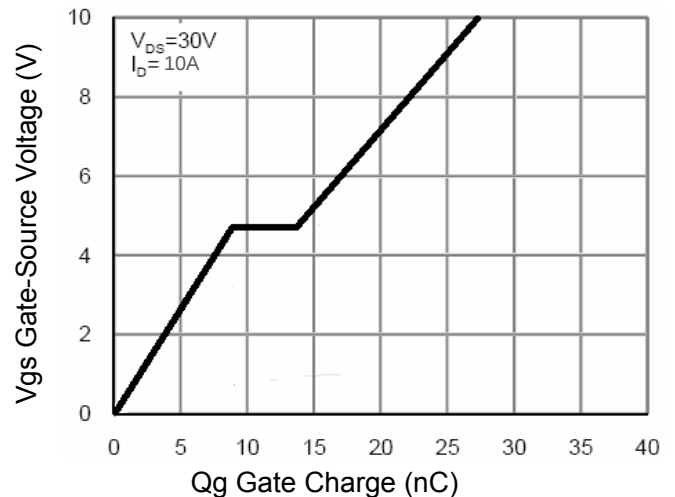


Figure 5 Gate Charge

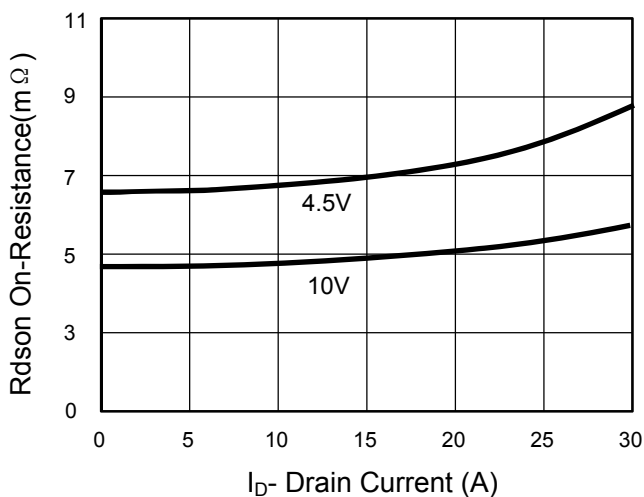


Figure 3 Rdson- Drain Current

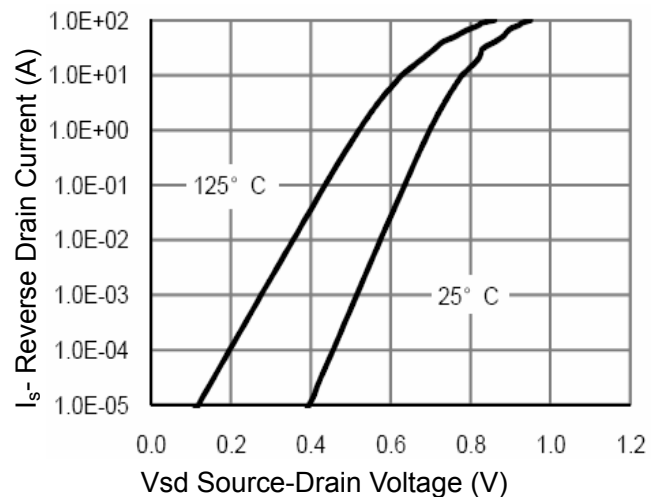


Figure 6 Source- Drain Diode Forward

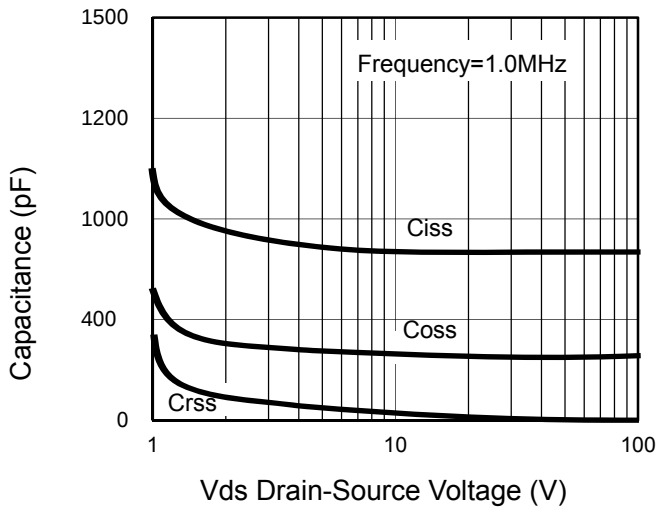


Figure 7 Capacitance vs Vds

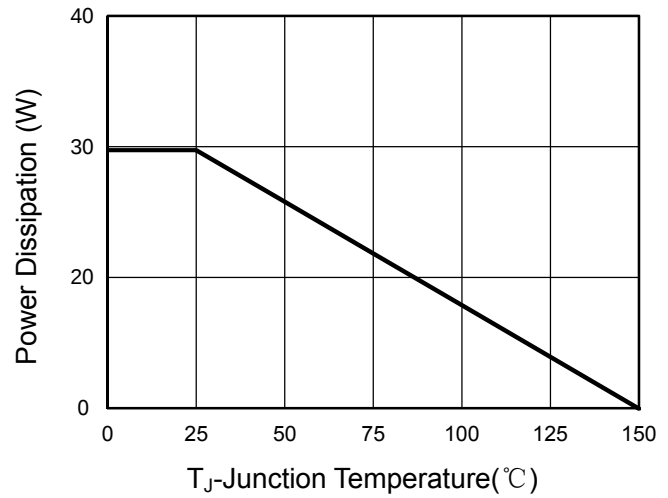


Figure 9 Power De-rating

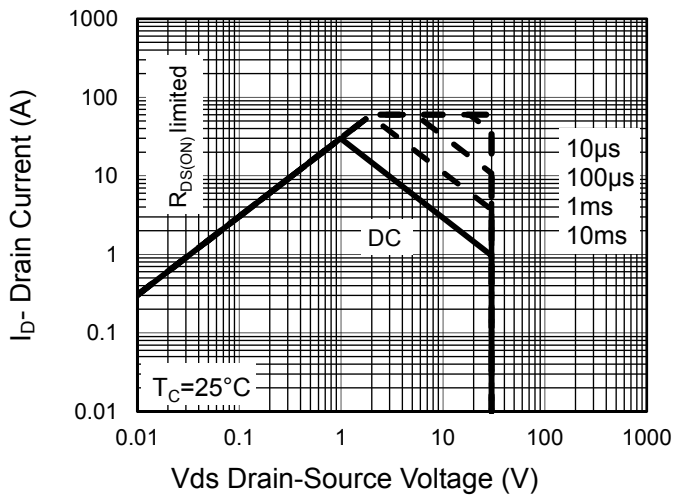


Figure 8 Safe Operation Area

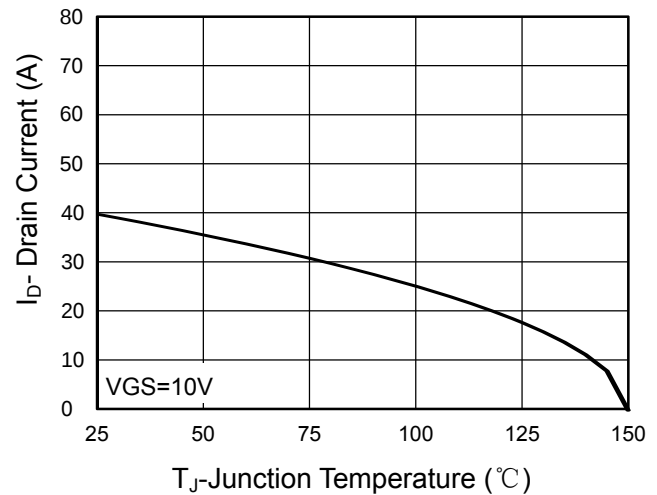


Figure 10 Current De-rating

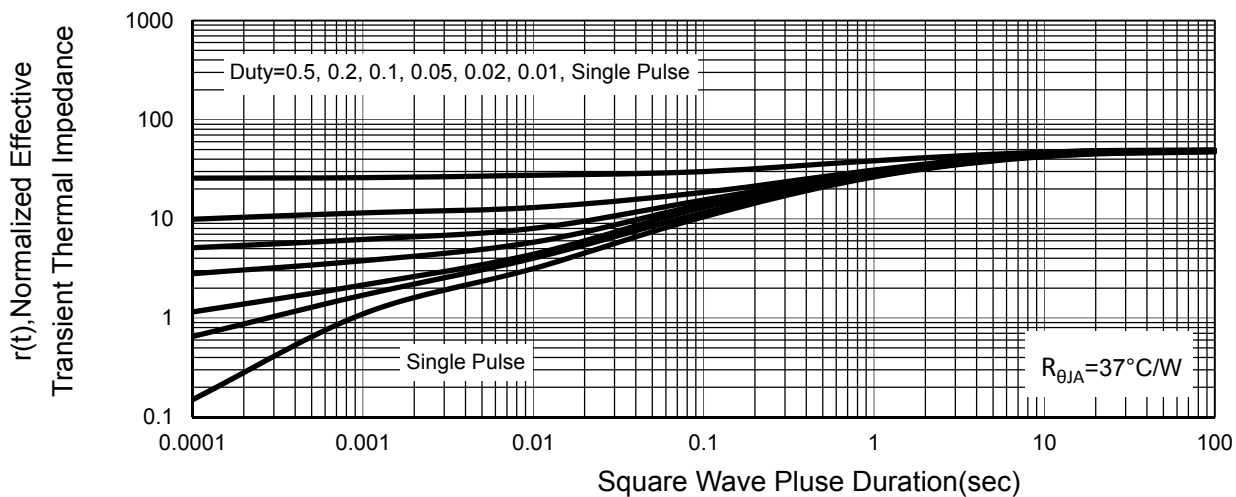
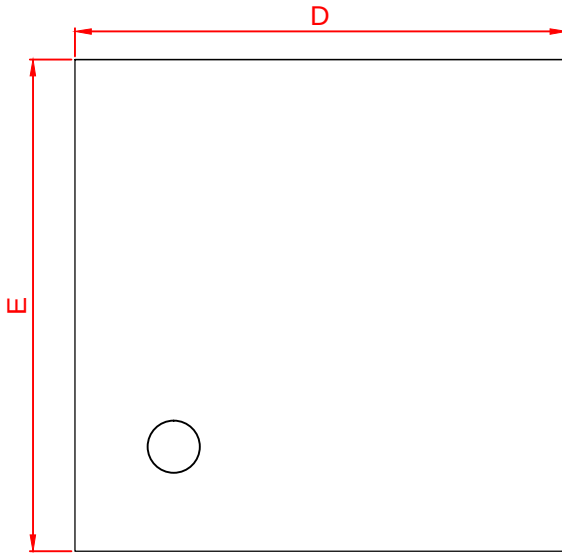
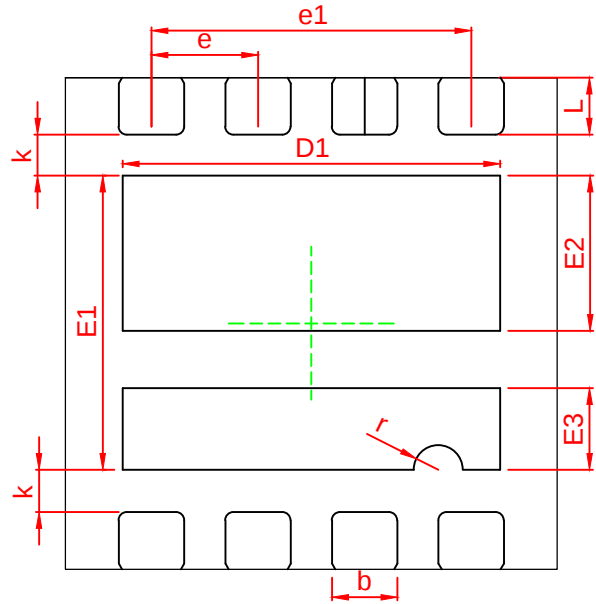


Figure 11 Normalized Maximum Transient Thermal Impedance

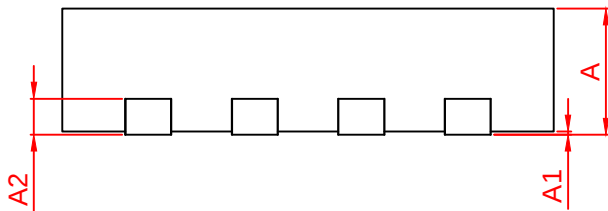
DFN3030-8L



TOPVIEW



BOTTOMVIEW



SIDEVIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
* A1	0.00	0.02	0.05
* b	0.35	0.40	0.45
* A2	0.203 BSC		
* D	2.95	3.00	3.05
* E	2.95	3.00	3.05
* D1	2.25	2.30	2.35
* E1	1.70	1.80	1.90
* E2	0.90	0.95	1.00
* E3	0.45	0.50	0.55
* e	0.65 BSC		
* e1	1.95 BSC		
* k	0.20	0.25	0.30
* L	0.30	0.35	0.40
r	0.15 REF		