

10A 650V N-channel Enhancement Mode Power MOSFET

1 Description

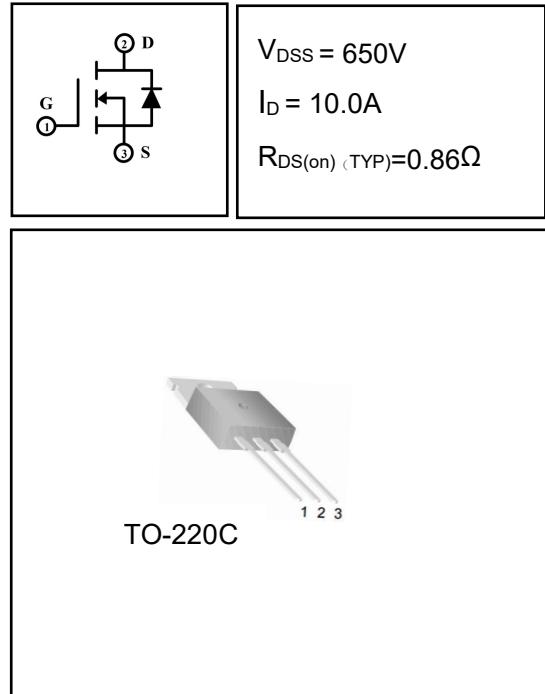
These N-channel enhanced vdmosfets, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. Which accords with the RoHS standard.

2 Features

- Fast switching
- ESD improved capability
- Low on resistance($R_{DS(on)} \leq 1.0\Omega$)
- Low gate charge(Typ: 32nC)
- Low reverse transfer capacitances(Typ: 7.0pF)
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

3 Applications

- Used in various power switching circuit for system miniaturization and higher efficiency.
- Power switch circuit of electron ballast and adaptor.



4 Electrical Characteristics

4.1 Absolute Maximum Ratings ($T_c=25^\circ C$, unless otherwise noted)

PARAMETER		SYMBOL	VALUE	UNIT
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current(continuous) ^(Note 3)		I_D	10	A
Drain Current(continuous)($T=100^\circ C$) ^(Note 3)		I_D	6.3	A
Drain Current(Pulsed)		I_{DM}	40	A
Single Pulse Avalanche Energy ^(Note 4)		E_{AS}	500	mJ
Derating Factor above $T_a=25^\circ C$		P_D	1.04	W
Power Dissipation $T_c=25^\circ C$			130	W
Operating Junction Temperature Range		T_j	-55~150	°C
Storage Temperature Range		T_{stg}	-55~150	°C
High Temperature(tin solder)		T_L	300	°C

4.2 Thermal Characteristics

PARAMETER		SYMBOL	VALUE	UNIT
Thermal Resistance, Junction to Case-sink		R_{thJC}	0.96	°C/W
Thermal Resistance, Junction to Ambient		R_{thJA}	62.5	°C/W

4.3 Electrical Characteristics

(T_C=25°C, unless otherwise noted)

PARAMETER	SYMBOL	Test Condition	VALUE			UNIT
			MIN	TYP	MAX	
Off Characteristics						
Drain-source Breakdown Voltage	BV _{DSS}	I _D =250μA,V _{GS} =0V	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V,V _{GS} =0V, T _C =25°C	--	--	1	μA
		V _{DS} =520V,V _{GS} =0V, T _C =125°C	--	--	100	μA
Gate-to-Body Leakage Current	I _{GSS}	V _{GS} =±30V,V _{DS} =0V	--	--	±100	nA
On Characteristics ^(Note 3)						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2.0	--	4.0	V
Drain-source on Resistance	R _{DS(on)}	V _{GS} =10V,I _D =5.0A	--	0.86	1.0	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V,V _{DS} =25V, f=1.0MHz	--	1642	--	pF
Output Capacitance	C _{oss}		--	128	--	
Reverse Transfer Capacitance	C _{rss}		--	7.0	--	
Turn-on Delay Time	T _{d(on)}	ID=10A, VDD=325V, VGS=10V, RG=10Ω	--	27	--	ns
Turn-on Rise Time	t _r		--	22	--	
Turn-off Delay Time	T _{d(off)}		--	53	--	
Turn-off Fall	t _f		--	24	--	
Total Gate Charge	Q _g	ID=10A, VDD=520V, VGS=10V	--	32	--	nc
Gate-to-Source Charge	Q _{gs}		--	8.0	--	
Gate-to-Drain("Miller")C harge	Q _{gd}		--	12	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{FSD}	V _{GS} =0V,I _s =10A	--	--	1.5	V
Continuous Source Current (BodyDiode) ^(Note 3)	I _s		--	--	10	A
Reverse Recovery Time	trr	T _J =25°C ,IF=10A, dI/dt=100A/μS,VGS=0V	--	530	--	ns
Reverse Recovery Charge	Qrr		--	3250	--	nc

Notes:

1: Repetitive rating, pulse width limited by maximum junction temperature.

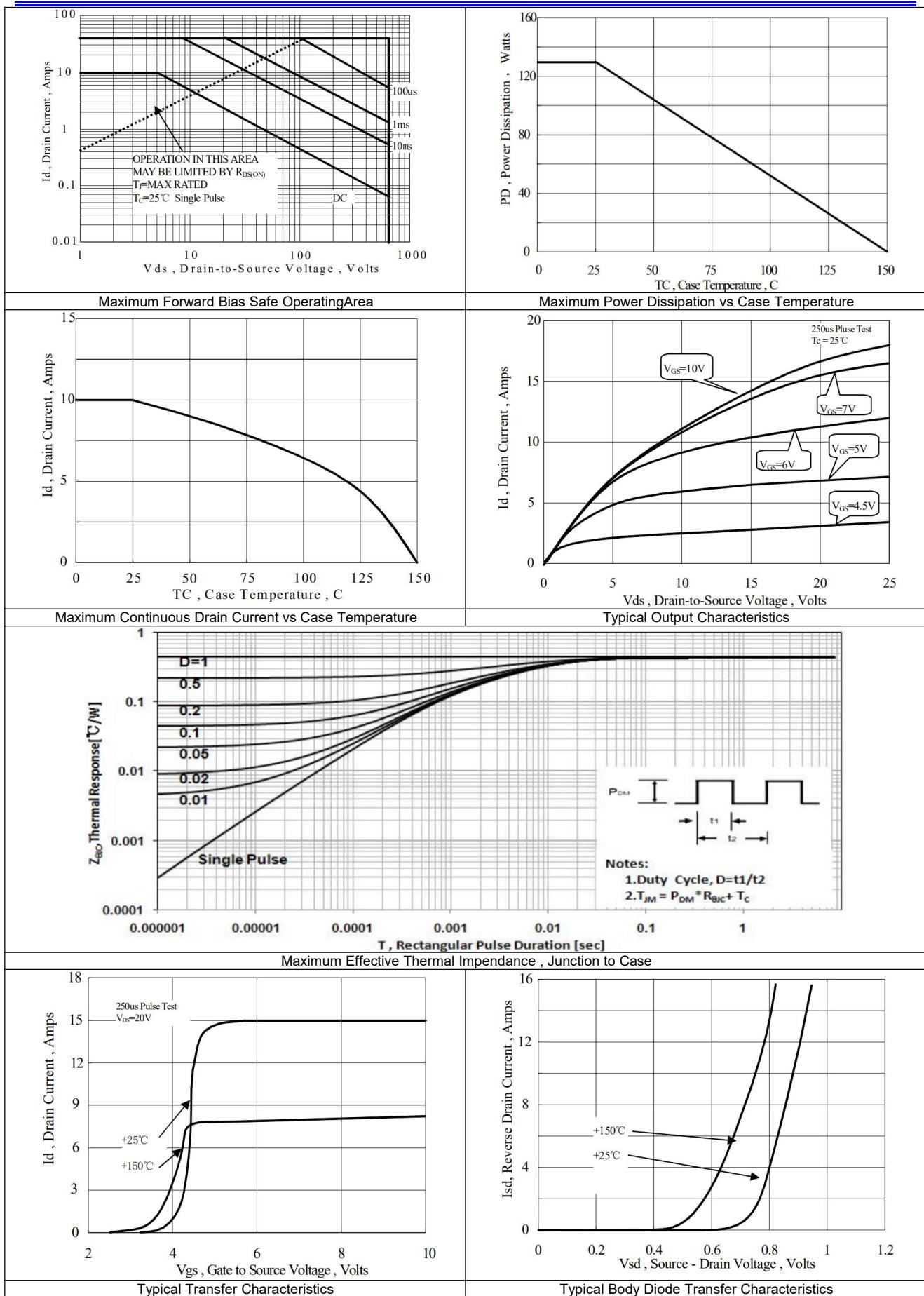
2: Surface mounted on FR4 Board, t≤10sec.

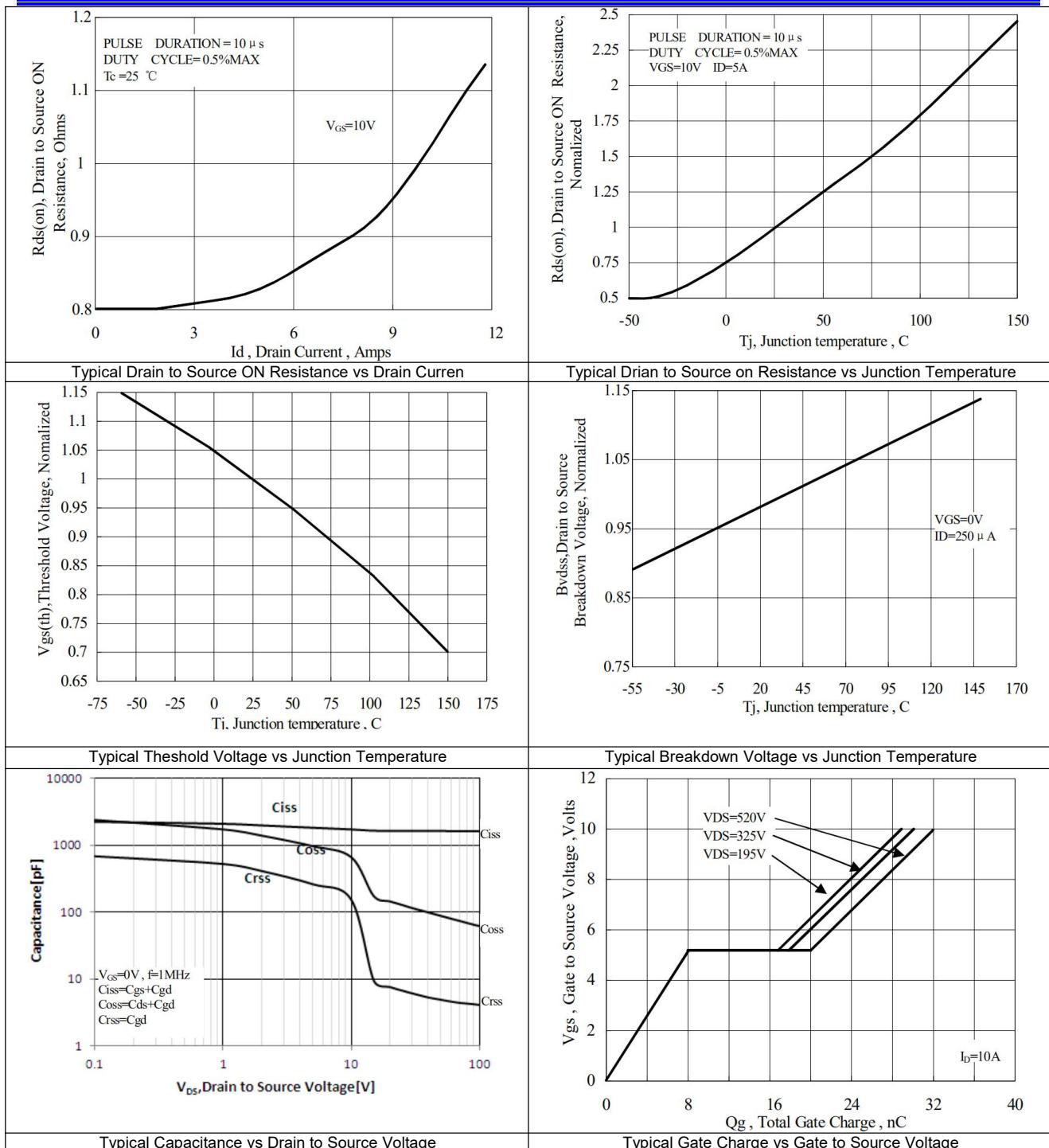
3: Pulse width ≤ 300μs, duty cycle ≤ 2%.

4: L=10mH,I_D=10A,V_{DD}=50V,,Start T_J=25°C.

5 Typical Test Circuit and Waveform

<p>Gate Charge Test Circuit:</p> <p>Circuit diagram showing a MOSFET (D.U.T.) with its gate connected to a current source of 1 mA. The drain voltage V_{DS} is measured across the drain and source terminals. The drain current I_D is indicated by a circle with a dot. The drain-to-source voltage V_{DS} is also indicated.</p>	<p>Gate Charge Waveforms:</p> <p>Graph showing V_{DS} and I_D versus V_{GS}. The vertical axis is labeled $V_{GS(TH)}$. The horizontal axis shows time intervals $t_{d(ON)}$, t_{rise}, $t_{d(OFF)}$, and t_{fall}.</p>
<p>Resistive Switching Test Circuit:</p> <p>Circuit diagram showing a MOSFET (D.U.T.) with its gate connected to a resistor R_G and drain connected to a load resistor R_L. The drain voltage V_{DS} is measured across the drain and source terminals. The drain current I_D is indicated by a circle with a dot.</p>	<p>Resistive Switching Waveforms:</p> <p>Graph showing V_{DS} and V_{GS} versus time. The vertical axis shows 90% and 10% levels. The horizontal axis shows $t_{d(ON)}$, t_{rise}, $t_{d(OFF)}$, and t_{fall}.</p>
<p>Diode Reverse Recovery Test Circuit:</p> <p>Circuit diagram showing a MOSFET (D.U.T.) with its drain connected to an inductor L and drain current I_D measured. A current pump is connected between the drain and source. A double pulse generator provides the gate signal. The drain voltage V_{DS} is measured across the drain and source terminals.</p>	<p>Diode Reverse Recovery Waveform:</p> <p>Graph showing I_D versus time. The vertical axis is labeled $di/dt = 100A/\mu A$. The horizontal axis shows t_{rr} and Q_{rr}.</p>
<p>Unclamped Inductive Switching Test Circuit:</p> <p>Circuit diagram showing a MOSFET (D.U.T.) with its drain connected to an inductor L and drain current I_{AS} measured. A series switch (MOSFET) and a commuting diode are also present. The drain voltage BV_{DSS} is indicated. The drain voltage V_{DD} is shown as a step function. The gate voltage V_{GS} is shown as a pulse.</p>	<p>Unclamped Inductive Switching Waveform:</p> <p>Graph showing V_{DD}, V_{GS}, and I_{AS} versus time. The vertical axis is labeled BV_{DSS}. The horizontal axis shows t_p, t_{AV}, and $E_{AS} = \frac{I_{AS}^2 L}{2}$.</p>



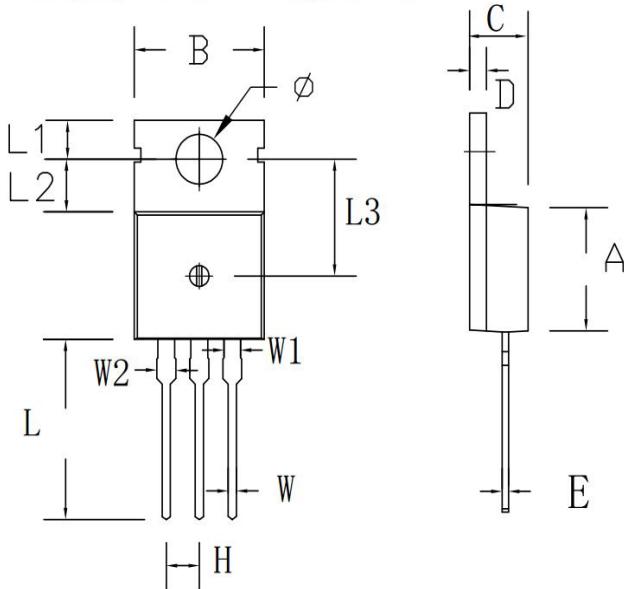


6 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
10N65	TO-220	10N65	Pb-free	Tube	1000/box

7 Dimensions

TO-220C PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	9.70	10.30	0.382	0.406
C	4.25	4.75	0.167	0.187
D	1.20	1.45	0.047	0.057
E	0.40	0.60	0.016	0.024
H	2.54 TYP		0.100 TYP	
W	0.60	0.95	0.024	0.037
W1	1.05	1.45	0.041	0.057
W2	1.20	1.60	0.047	0.063
L	12.60	13.40	0.496	0.528
L1	2.45	2.95	0.096	0.116
L2	3.45	3.95	0.136	0.156
L3	8.15	8.65	0.321	0.341
Φ	3.50	3.90	0.138	0.154

8 Attenions

- Jiangsu Donghai Semiconductor Co.,Ltd. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of Jiangsu Donghai Semiconductor Co.,Ltd. products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

9 Appendix

Revision history:

Date	REV.	Description	Page
2020.03.09	1.0	Original	
2022.01.01	1.1	Modify company name	all

