N-Channel Enhancement Mode Power MOSFET

Description

The PES016N08R uses deep trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

General Features

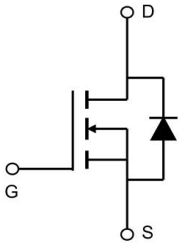
- V_{DS}= 90V, I_D= 360A

  $R_{DS(ON)}$ < 1.6mΩ @V_{GS}=10V

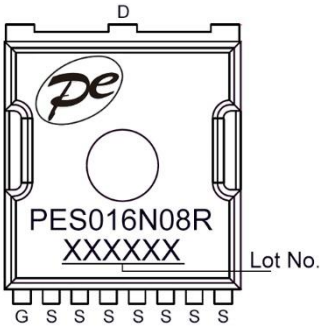
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

- DC/DC converter
- High frequency switching and synchronous rectification



Schematic diagram



Marking and pin assignment

TOLL

Absolute Maximum Ratings (TC=25℃ unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	90	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	360	A
Drain Current-Continuous (T_C=100℃)	I_D(T_C=100℃)	275	A
Pulsed Drain Current (Note 1)	I_{DM}	1440	A
Maximum Power Dissipation	P_D	460	W
Single Pulsed Avalanche Energy (L=0.5mH)	E_{AS}	2500	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.3	℃/W
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	45	℃/W

Electrical Characteristics (TC=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	90	98	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=80V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2.6	3.3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=50A	-	1.3	1.6	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=50A	-	110	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=40V,V_{GS}=0V, F=1.0MHz	-	8575	-	pF
Output Capacitance	C_{oss}		-	1691	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	35	-	pF
Gate Resistance	R_g	V_{DS}=0V,V_{GS}=0V,F=1.0MHz	-	2.4	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=40V,I_D=50A, V_{GS}=10V,R_G=5Ω	-	37	-	nS
Turn-on Rise Time	t_r		-	32	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	95	-	nS
Turn-Off Fall Time	t_f		-	30	-	nS
Total Gate Charge	Q_g	V_{DS}=40V,I_D=50A, V_{GS}=10V	-	245	-	nC
Gate-Source Charge	Q_{gs}		-	66	-	nC
Gate-Drain Charge	Q_{gd}		-	65	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=10A	-	-	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F=85A,dI/dt=100A/μs		105		ns
Body Diode Reverse Recovery Charge	Q_{rr}			310		nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product.

Typical Electrical and Thermal Characteristics

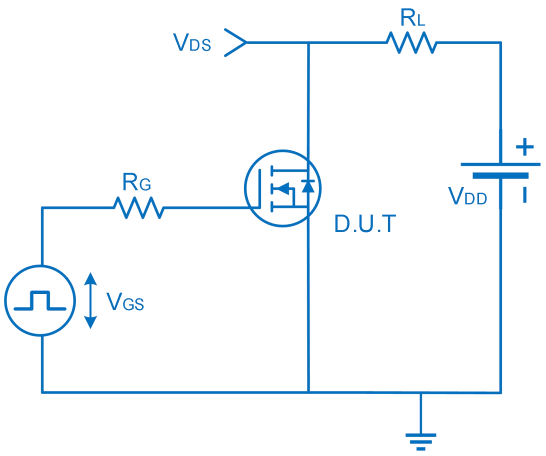


Figure 1 Switching Test Circuit

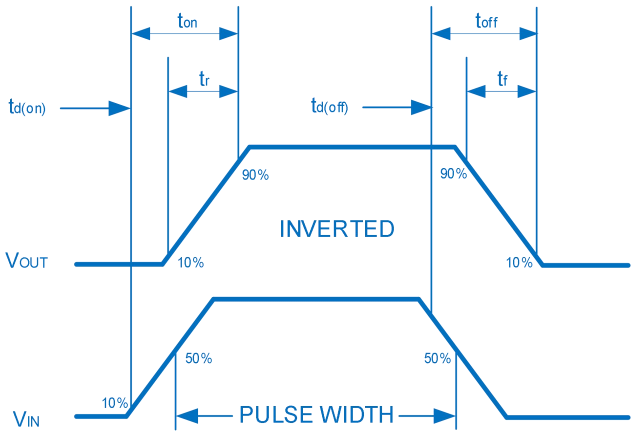


Figure 2 Switching Waveform

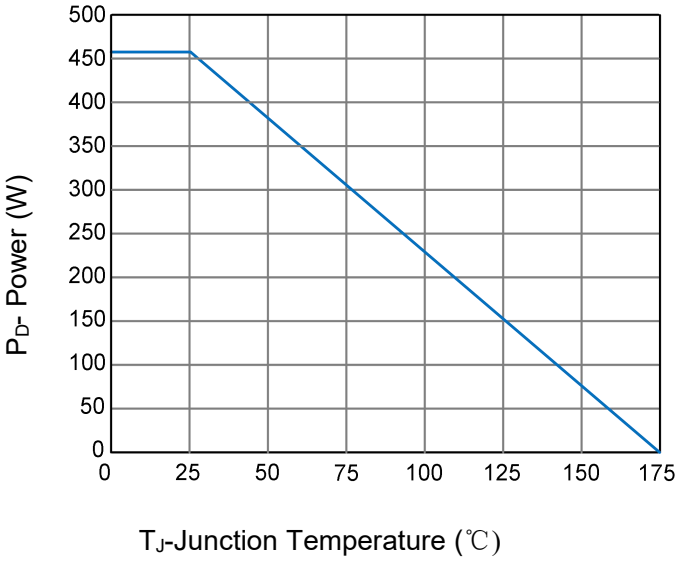


Figure 3 Power De-rating

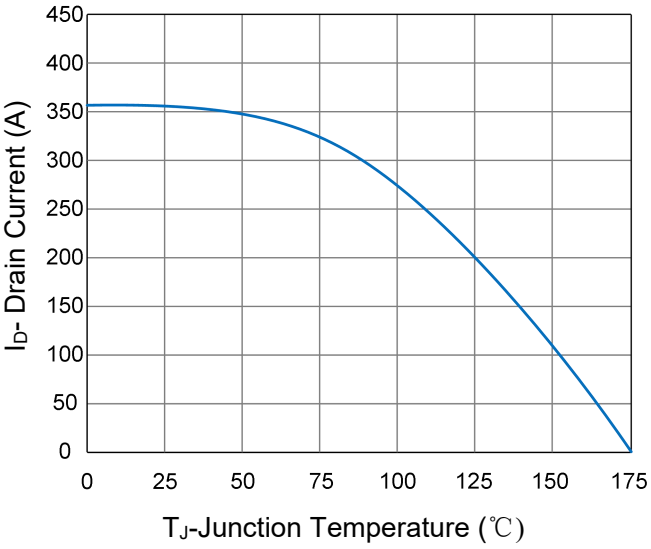


Figure 4 Drain Current

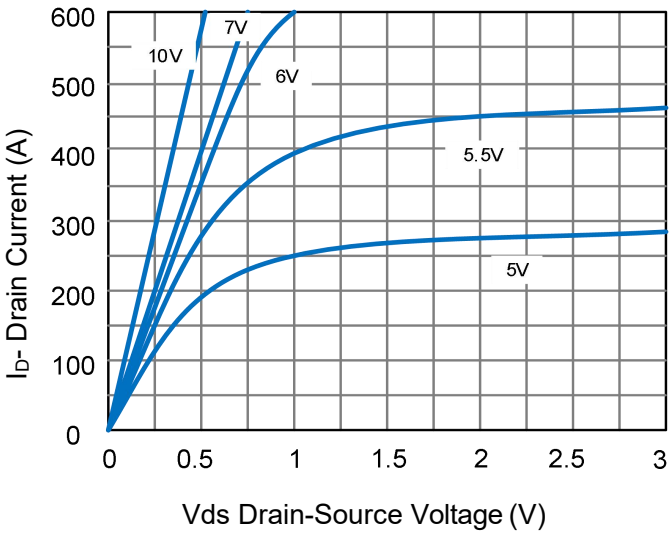


Figure 5 Output Characteristics

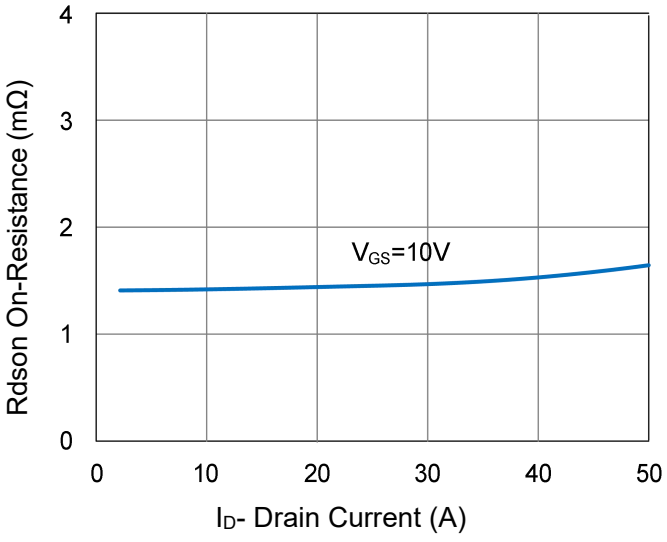


Figure 6 Rdson vs Drain Current

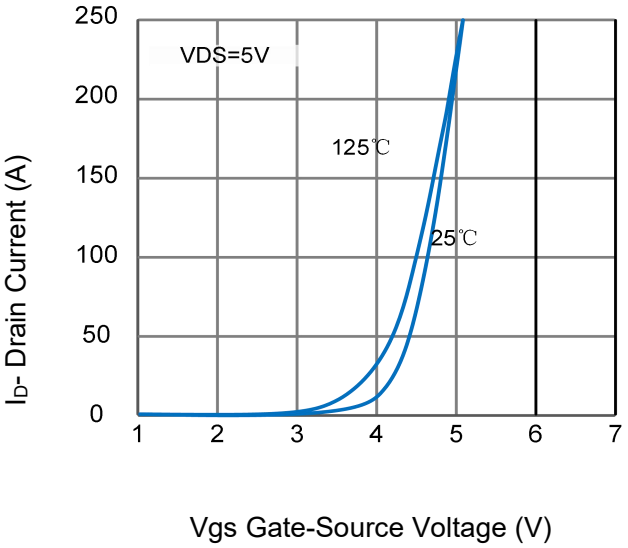


Figure 7 Transfer Characteristics

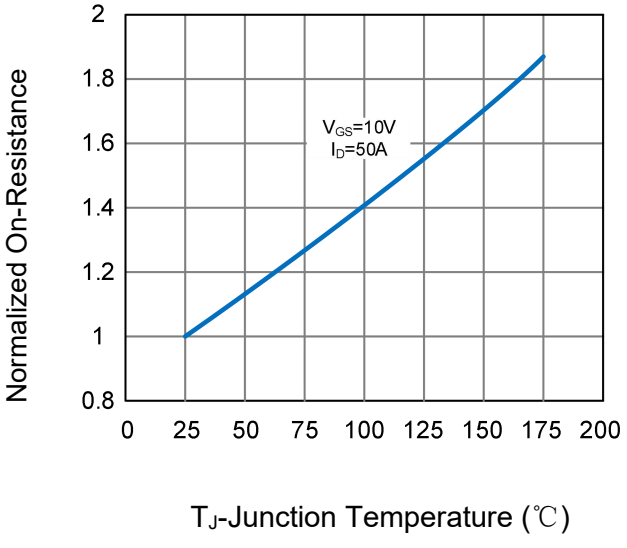


Figure 8 Rdson vs Junction Temperature

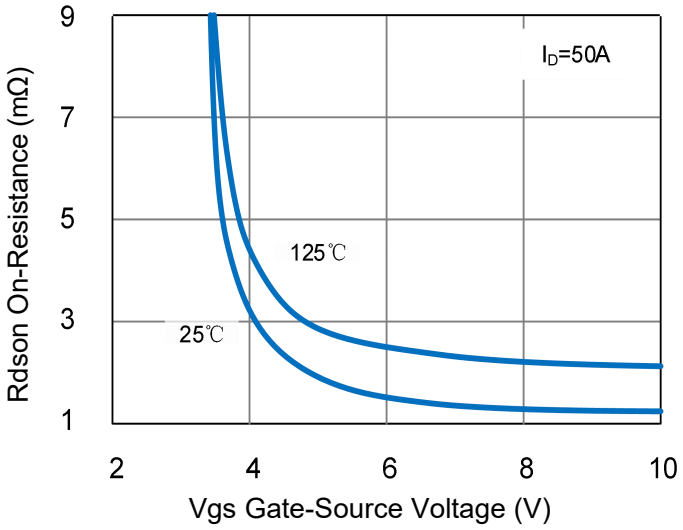


Figure 9 Rdson vs Vgs

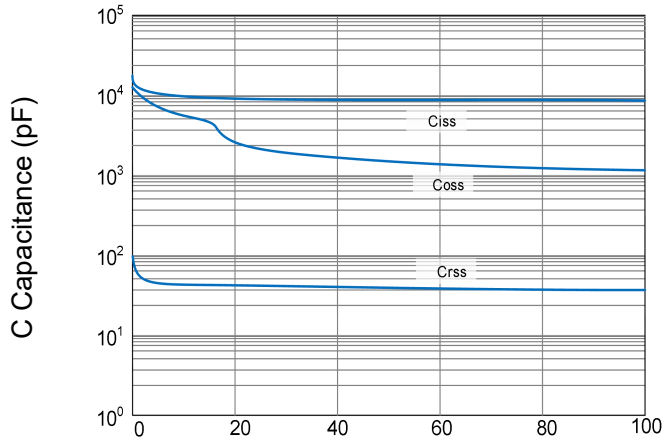


Figure 10 Capacitance vs Vds

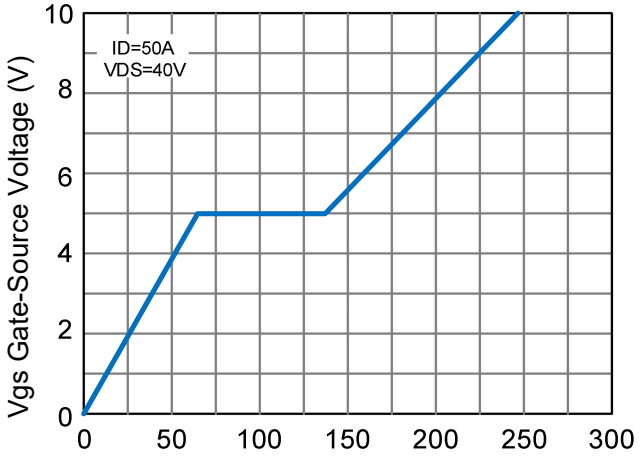


Figure 11 Gate Charge

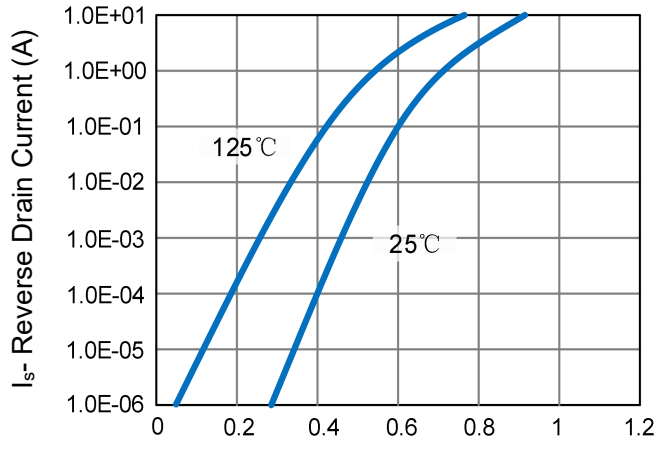


Figure 12 Source- Drain Diode Forward

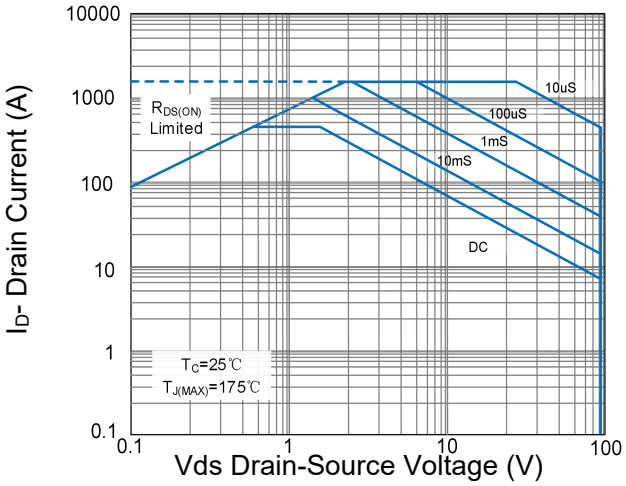


Figure 13 Safe Operation Area

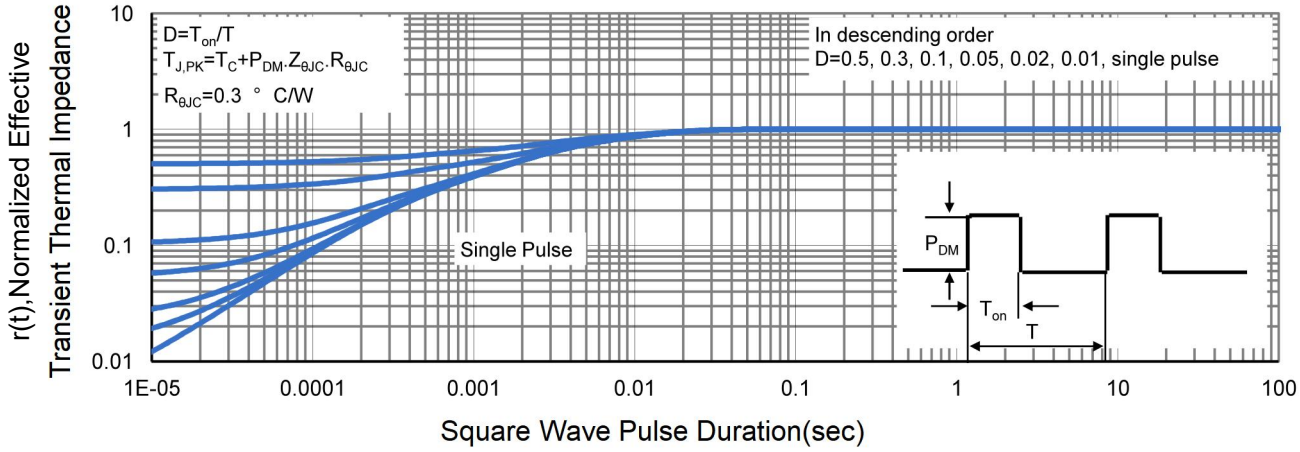
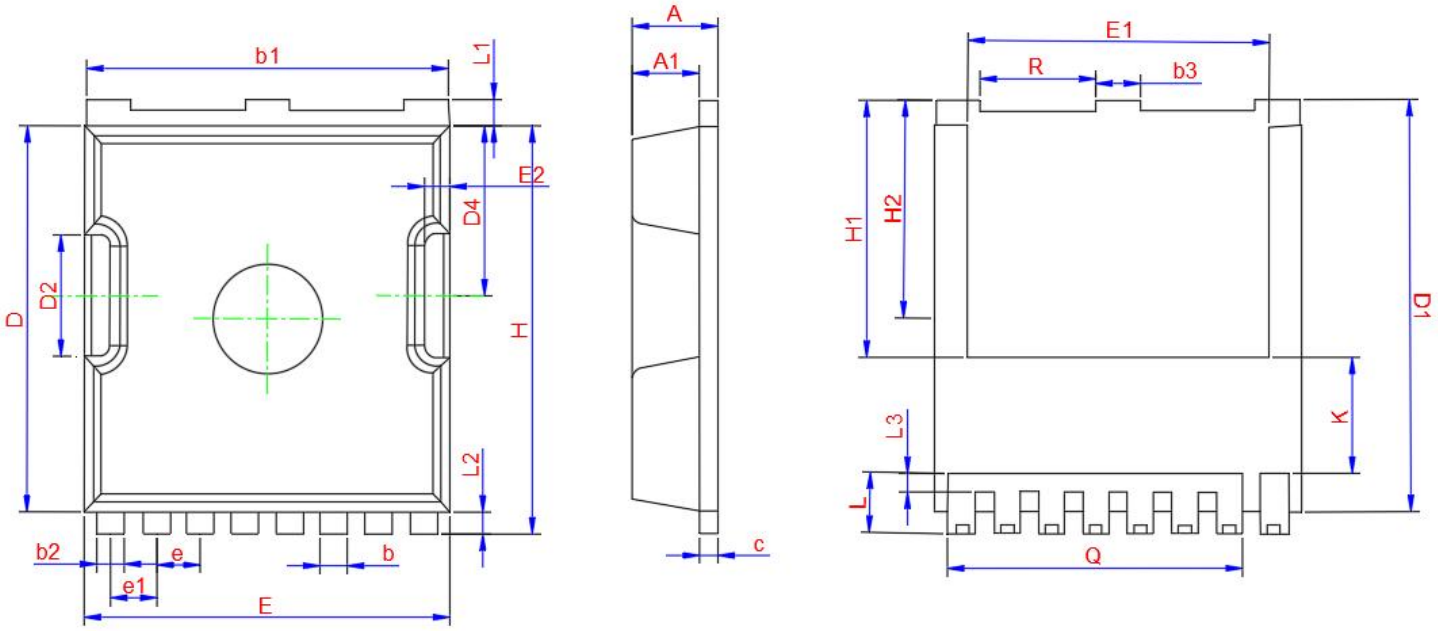


Figure 14 Normalized Maximum Transient Thermal Impedance

TOLL Package Information



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	2.200	2.300	2.400	E2	0.500	0.600	0.700
A1	1.700	1.800	1.900	e	1.200 BSC		
b	0.600	0.700	0.800	e1	1.225 BSC		
b1	9.700	9.800	9.900	H	11.600	11.700	11.800
b2	0.650	0.750	0.850	H1	6.950 BSC		
b3	1.100	1.200	1.300	H2	5.900 BSC		
c	0.400	0.500	0.600	K	3.100 REF.		
D	10.300	10.400	10.500	L	1.550	1.650	1.750
D1	11.000	11.100	11.200	L1	0.600	0.700	0.800
D2	3.200	3.300	3.400	L2	0.500	0.600	0.700
D4	4.470	4.570	4.670	L3	0.400	0.500	0.600
E	9.800	9.900	10.000	Q	7.950 REF.		
E1	8.000	8.100	8.200	R	3.000	3.100	3.200