Wuxi Unigroup Microelectronics CO.,LTD.

30V N-Channel Trench MOSFET(Preliminary)

Features

- Trench Power Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for Fast-switching Applications

Applications

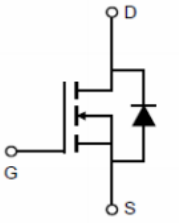
- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

Product Summary

VDS	30V
$R_{DS(ON)}$ (at V_{GS}=10V)	< 5mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 7mΩ
I_D (at V_{GS}=10V)	90A
100% UIS Tested	

RoHS

TO-252



Device	Package	Marking
TTD90N03AT	TO-252	90N03AT

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage (V_{GS} = 0V)		V_{DSS}	30	V
Continuous Drain Current [B]	T_C = 25ºC	I_D	51	A
	T_C = 100ºC		51	
Pulsed Drain Current [A]		I_{DM}	270	A
Gate-Source Voltage		V_{GS}	±20	V
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	72	mJ
Avalanche Current [A]		I_{As}	22	A
Power Dissipation [C]	T_C = 25ºC	P_D	108	W
	T_C = 100ºC	P_D	82	W
Operating Junction and Storage Temperature Range		T_J, T_{SGT}	-55~+175	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	1.45	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	100	

Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	30	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 30V, V_{GS} = 0V, T_J = 100ºC	--	--	25	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.7	2.4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 30A	--	3.6	5.0	mΩ
		V_{GS} = 4.5V, I_D = 30A	--	5	7.0	mΩ
Forward Transconductance	g_{fs}	V_{DS} = 10V, I_D =20A	17.3	--	--	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 15V, f = 1.0MHz	--	1608	--	pF
Output Capacitance	C_{oss}		--	513	--	
Reverse Transfer Capacitance	C_{rss}		--	297	--	
Total Gate Charge	Q_g	V_{DD} = 15V, I_D = 50A, V_{GS} = 10V	--	62	--	nC
Gate-Source Charge	Q_{gs}		--	7	--	
Gate-Drain Charge	Q_{gd}		--	13	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 15V, I_D = 50A, R_G = 3Ω	--	13	--	ns
Turn-on Rise Time	t_r		--	17	--	
Turn-off Delay Time	$t_{d(off)}$		--	42	--	
Turn-off Fall Time	t_f		--	13	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current [B]	I_S	T_C = 25ºC	--	--	46	A
Pulsed Diode Forward Current [A]	I_{SM}		--	--	270	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 30A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Time	t_{rr}	I_F = 30A, di_F/dt = 100A/μs	--	40	--	ns
Reverse Recovery Charge	Q_{rr}		--	88	--	nC

Notes

1. Repetitive Rating: Pulse Width limited by maximum junction temperature
2. V_{DD} = 30V, R_G = 25Ω, Starting T_J = 25°C
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

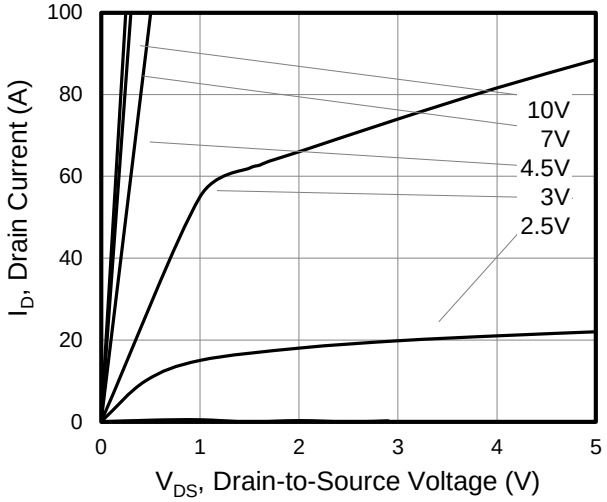


Figure 2. Transfer Characteristics

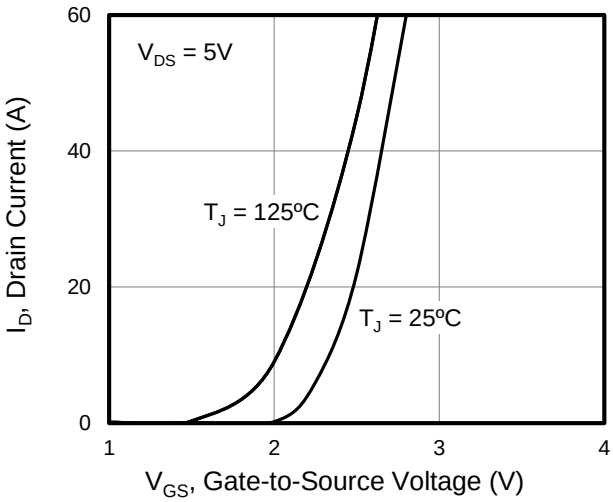


Figure 3. On-Resistance vs. Drain Current

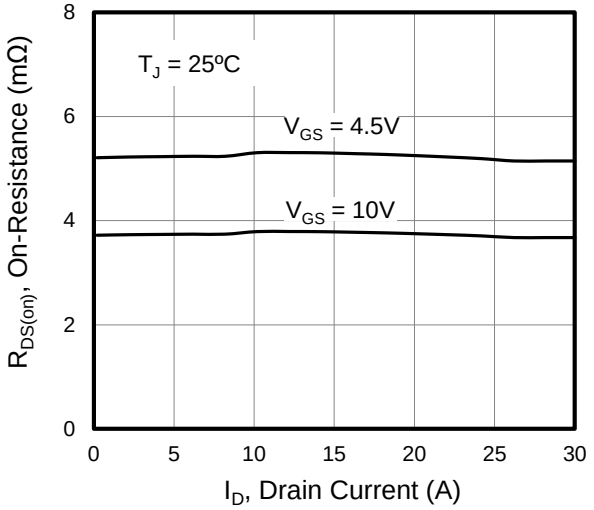


Figure 4. Capacitance

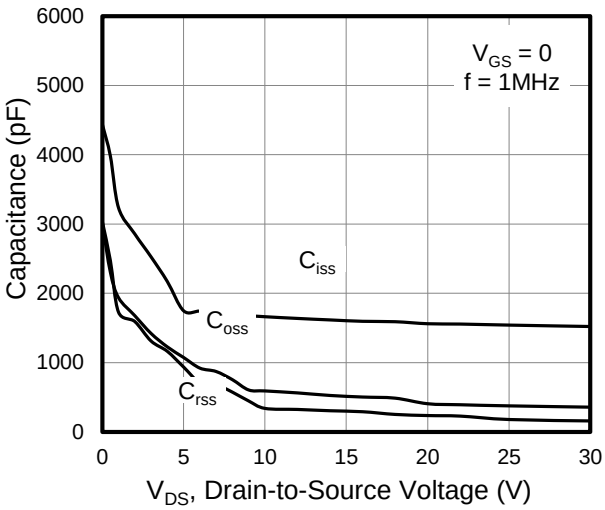


Figure 5. Gate Charge

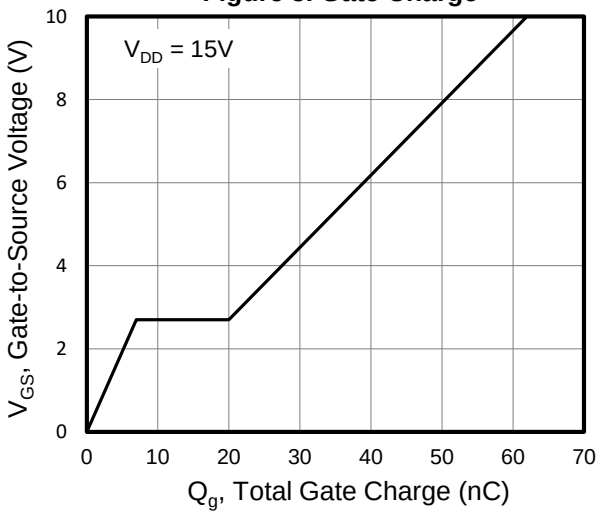
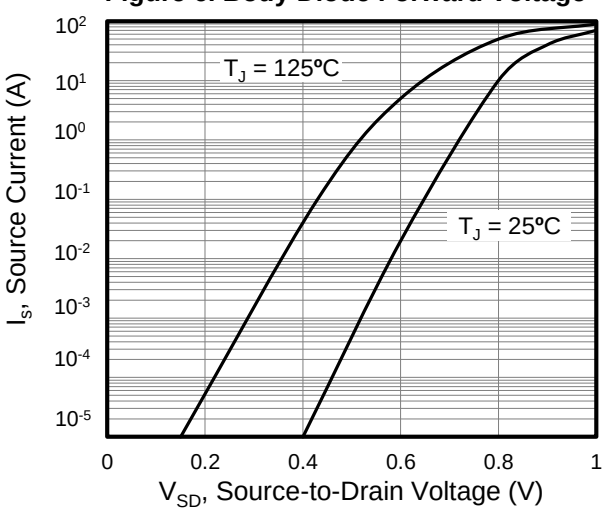


Figure 6. Body Diode Forward Voltage



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

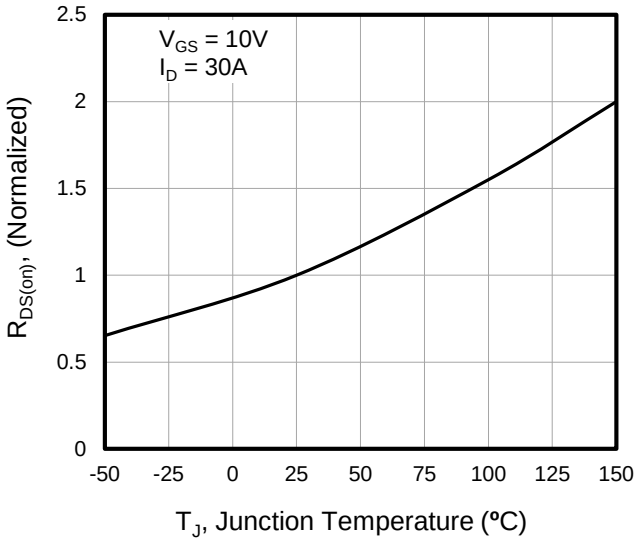


Figure 8. Threshold Voltage vs. Junction Temperature

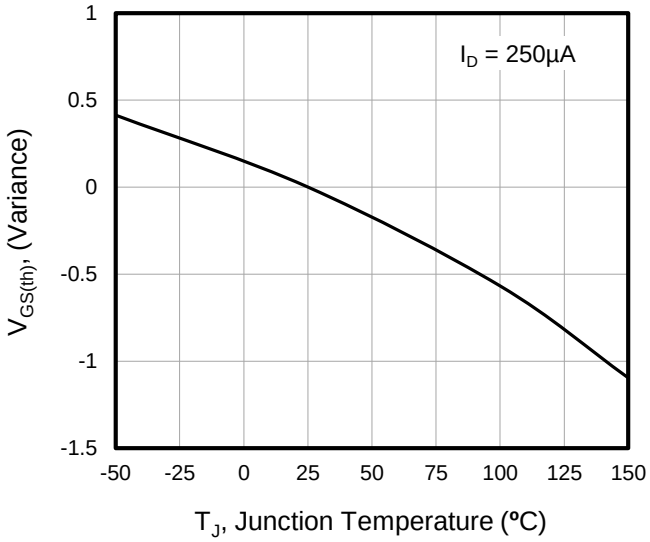


Figure 9. Transient Thermal Impedance

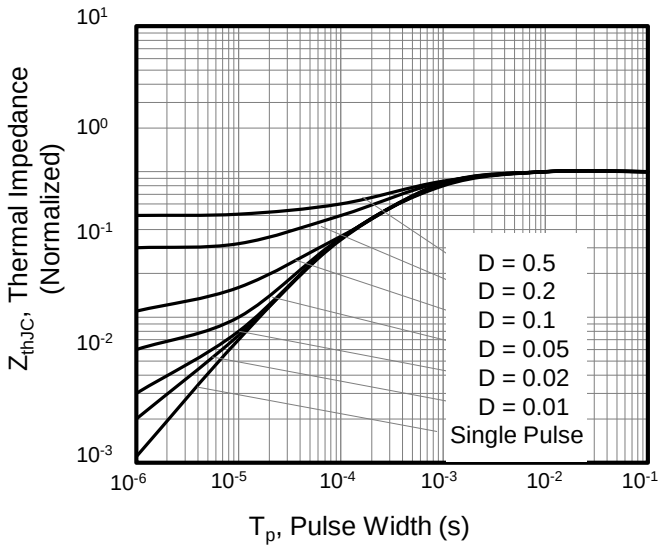


Figure 10. Safe operation area

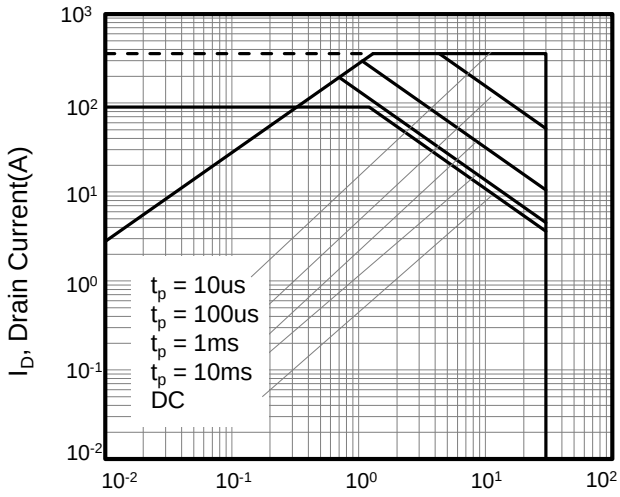


Figure A：Gate Charge Test Circuit and Waveform

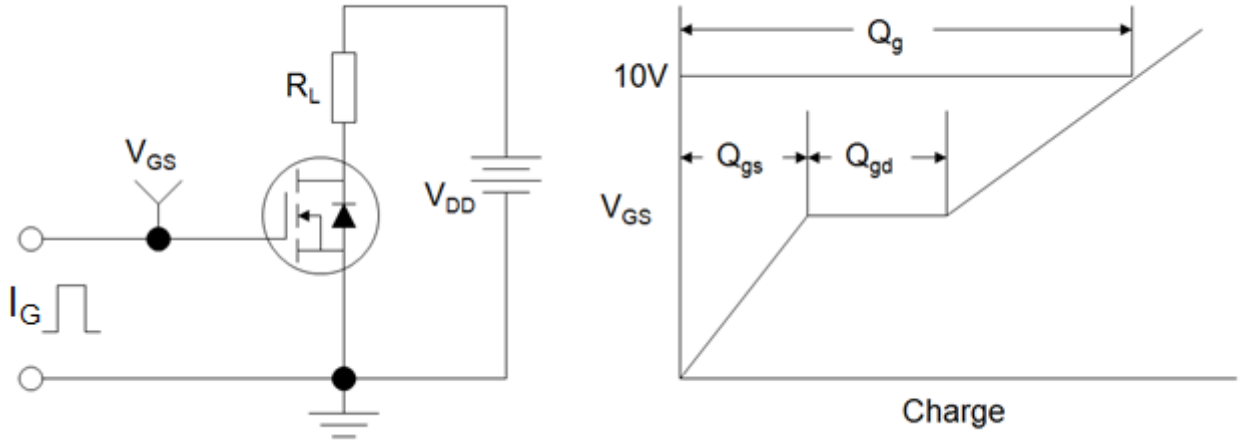


Figure B：Resistive Switching Test Circuit and Waveform

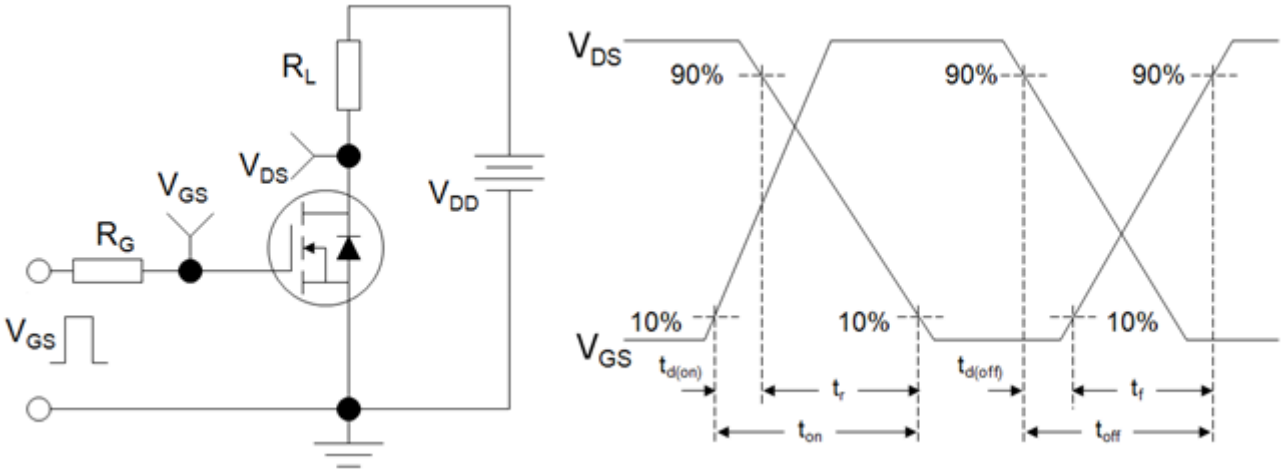
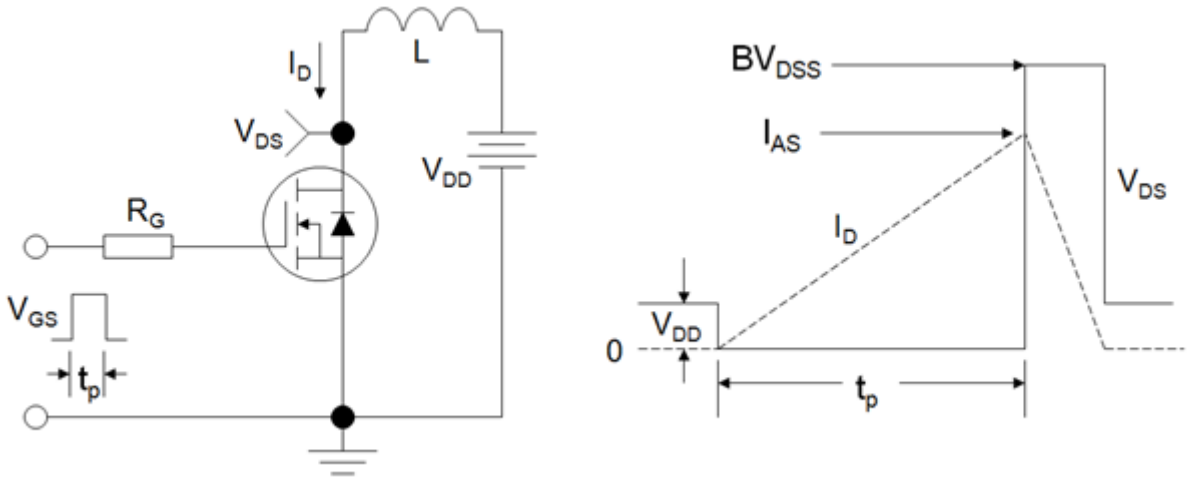
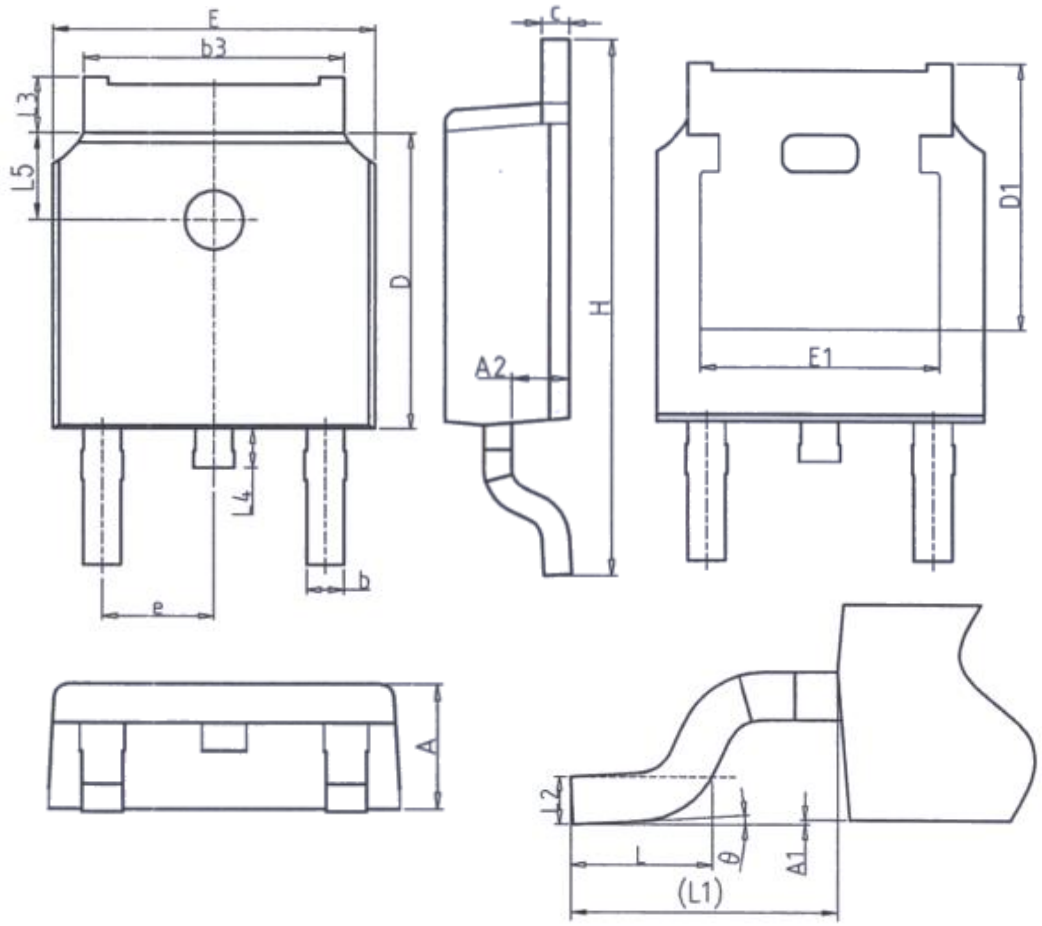


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



TO-252(H)



Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A1	0.00	0.20
A2	0.97	1.17
b	0.68	0.90
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22
D1	5.30REF	
E	6.40	6.80
E1	4.63	–

Unit: mm		
Symbol	Min.	Max.
e	2.286BSC	
H	9.40	10.50
L	1.38	1.75
L1	2.90REF	
L2	0.51BSC	
L3	0.88	1.28
L4	–	1.00
L5	1.65	1.95
θ	0°	8°

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