

TPGW15N120LN

IGBT Discrete with Anti-Parallel Diode

General Description

Topdiode TPGW15N120LN 15A 1200V IGBT Discrete provides ultra-low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS.

Features

High Breakdown Voltage up to 1200V for Improved

Reliability

Trench Field Stop Technology

High Ruggedness, Temperature Stable

Low switching losses

Easy Parallel Switching Capability due to Positive

Temperature Coefficient in V_{CEsat}

Maximum junction temperature 175°C

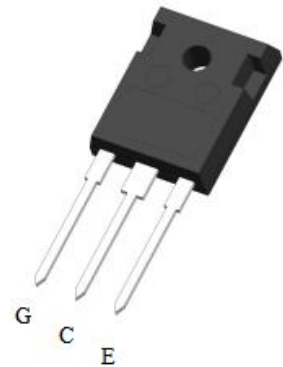
Applications

Uninterruptible Power Supply

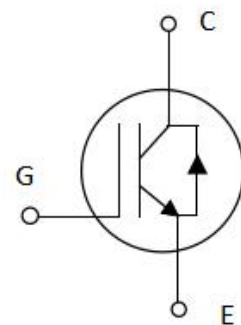
Inverter

Converter with High Switching Frequency

Package TO-247-3



Equivalent Schematic



Summary

Symbol	Value
V_{CE}	1200V
I_C	15A
$V_{CE(sat)}$ $I_C=15A$	1.85V

Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Description	Value	Unit
V_{CE}	Collector-Emitter Breakdown Voltage	1200	V
I_C	DC Collector Current, Limited by T_{jmax}	$T_C=25^\circ\text{C}$ 30	A
		$T_C=100^\circ\text{C}$ 15	A
I_F	Diode Forward Current, Limited by T_{jmax}	$T_C=25^\circ\text{C}$ 30	A
		$T_C=100^\circ\text{C}$ 15	A
V_{GE}	Continuous Gate-Emitter voltage	± 20	V
V_{GE}	Transient Gate-Emitter voltage($t_p \leq 10\mu\text{s}, D < 0.010$)	± 30	V
I_{CRM}	Repetitive peak collector current, $t_p = 1\text{ms}$	30	A
I_{CM}	Pulse Collector Current, $V_{GE} = 15\text{V}$, t_p Limited by T_{jmax}	60	A
T_{SC}	Short Circuit Withstand Time, $V_{GE} = 15\text{V}, V_{CC} = 900\text{V}, V_{CEM} \leq 1200\text{V}$	10	us
P_{tot}	Power Dissipation, $T_j = 25^\circ\text{C}$	200	W
T_j	Operating Junction Temperature	-40 to +175	$^\circ\text{C}$
T_s	Storage Temperature	-55 to +150	$^\circ\text{C}$
-	Soldering Temperature, Wave Soldering 1.6mm (0.063in.) from Case for 10s	260	$^\circ\text{C}$

Thermal Characteristics

Symbol	Description	Max	Unit
R_{thJC}	IGBT Thermal Resistance, Junction - Case	0.75	K/W
R_{thJC}	Diode Thermal Resistance, Junction - Case	1.35	K/W
R_{thJA}	Thermal Resistance, Junction - Ambient	40	K/W

Electrical Characteristics (T_j= 25°C unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
Static						
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V, I _C =250uA	1200			V
		V _{GE} =0V, I _C =0.5mA	1200			V
V _{GE(th)}	Gate Threshold Voltage	V _{GE} =V _{CE} , I _C =0.5mA	5.1	5.8	6.4	V
V _(sat)	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =15A	T _j =25°C	1.85		V
			T _j =125°C	2.20		
			T _j =150°C	2.30		
I _{CES}	Zero Gate Voltage Collector Current	V _{CE} = 1200V, V _{GE} = 0V	T _j =25°C		250	μA
			T _j =150°C		5000	
I _{GES}	Gate-Emitter Leakage Current	V _{CE} = 0V, V _{GE} = ±20V			100	nA
Dynamic						
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} = 0V, f=1MHz		1203		pF
C _{res}	Reverse Transfer Capacitance			41		
Q _G	Gate Charge	V _{CC} = 960V, I _C = 15A, V _{GE} = 15V		140		nC
I _{SC}	Short Circuit Collector Current	V _{CC} = 900V, t _{sc} ≤ 10us, V _{GE} = 15V, T _j ≤ 150°C		60		A

Switching Characteristic, Inductive Load

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
Dynamic T _j =25°C						
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =15.0A, V _{GE} =-15.0/15.0V, R _g =33Ω		45		ns
t _r	Rise Time			52		ns
t _{d(off)}	Turn-off Delay Time			128		ns
t _f	Fall Time			186		ns
E _{on}	Turn-on Energy			1.5		mJ
E _{off}	Turn-off Energy			0.9		mJ
Dynamic T _j =125°C						
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =15.0A,		50		ns

t_r	Rise Time	$V_{GE}=-15.0/15.0V,$ $R_g=33\Omega$		60		ns
$t_{d(off)}$	Turn-off Delay Time			285		ns
t_f	Fall Time			150		ns
E_{on}	Turn-on Energy			1.33		mJ
E_{off}	Turn-off Energy			0.9		mJ

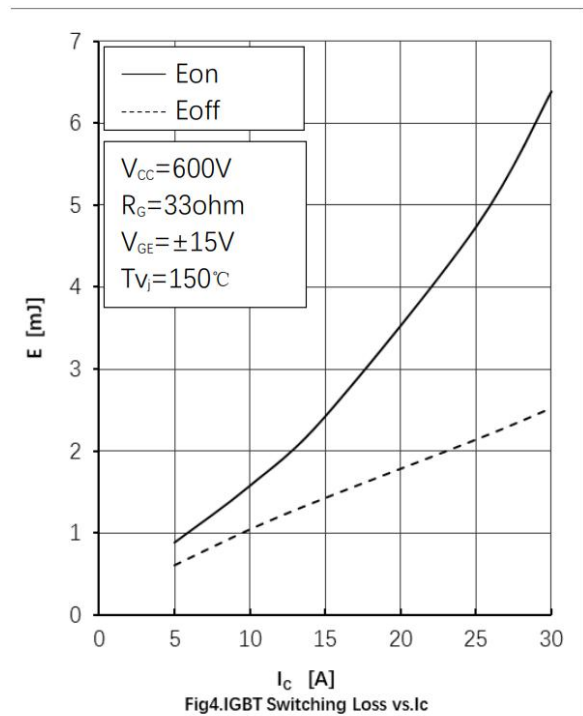
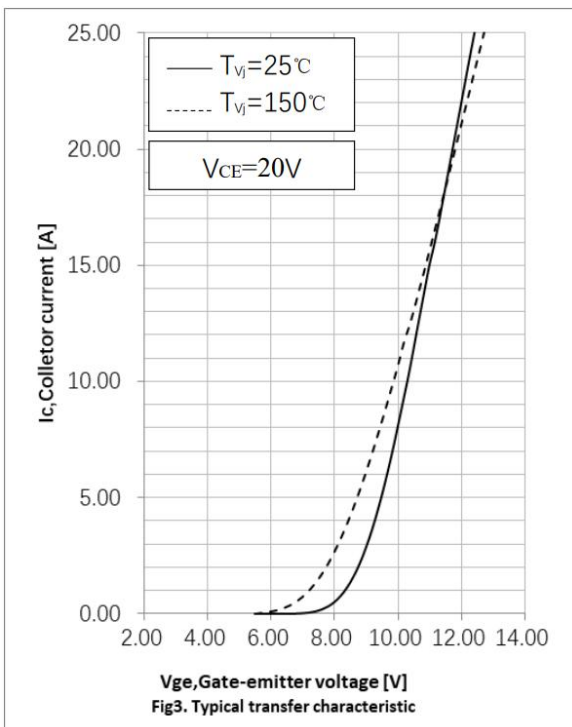
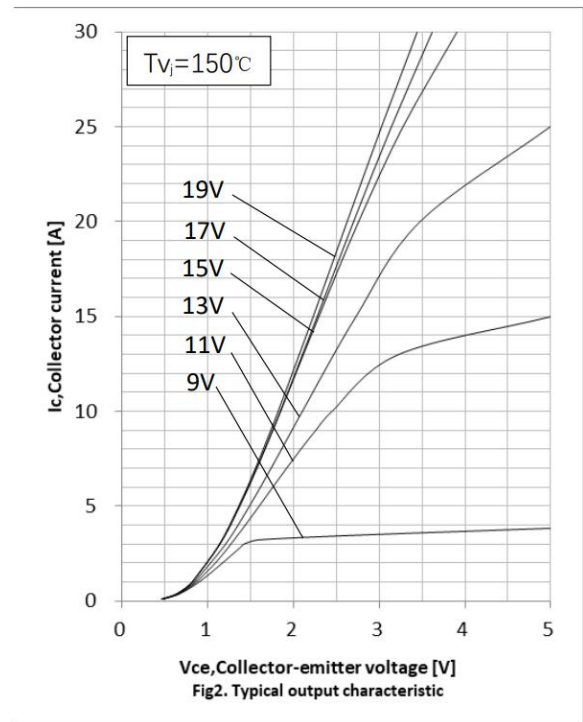
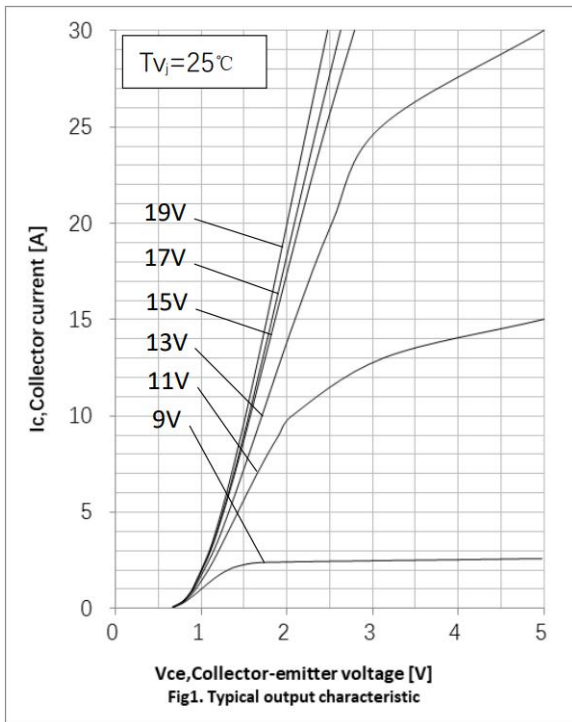
Dynamic $T_j=150^\circ C$

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=15.0A,$ $V_{GE}=-15.0/15.0V,$ $R_g=33\Omega$		52		ns
t_r	Rise Time			58		ns
$t_{d(off)}$	Turn-off Delay Time			170		ns
t_f	Fall Time			138		ns
E_{on}	Turn-on Energy			2.4		mJ
E_{off}	Turn-off Energy			1.45		mJ

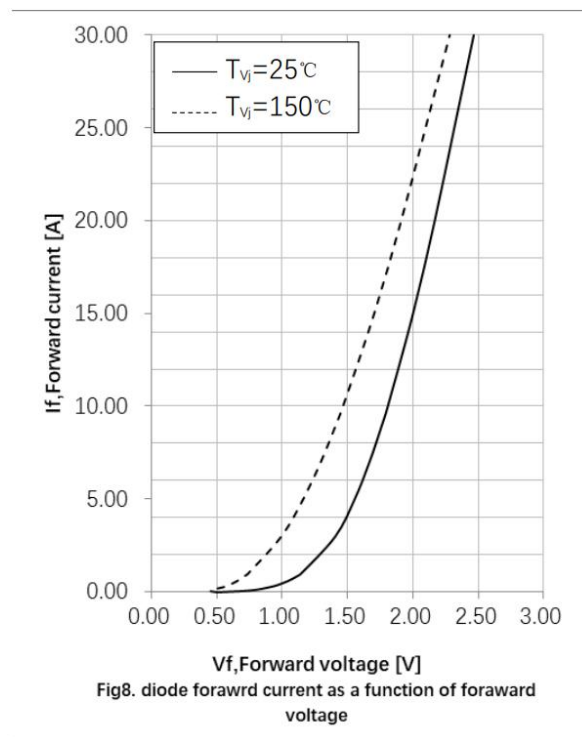
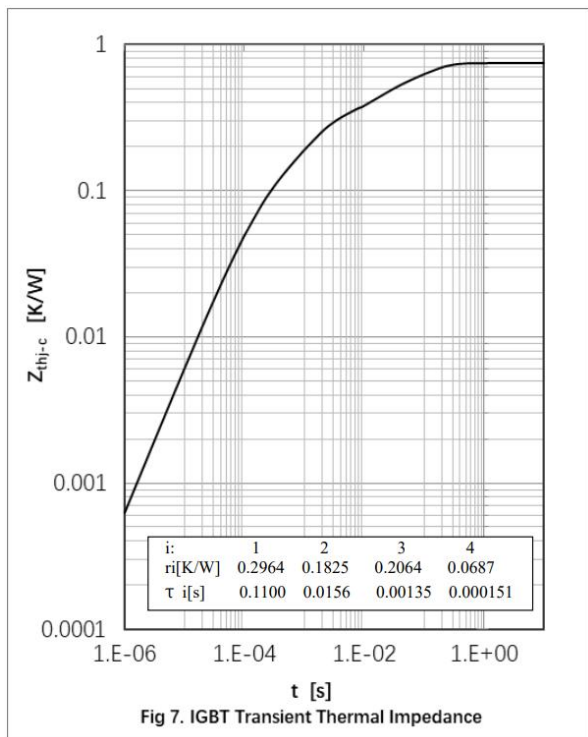
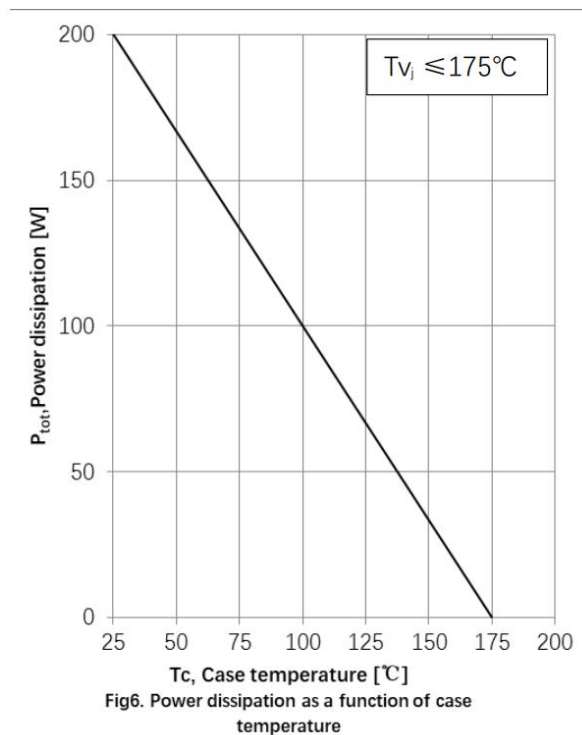
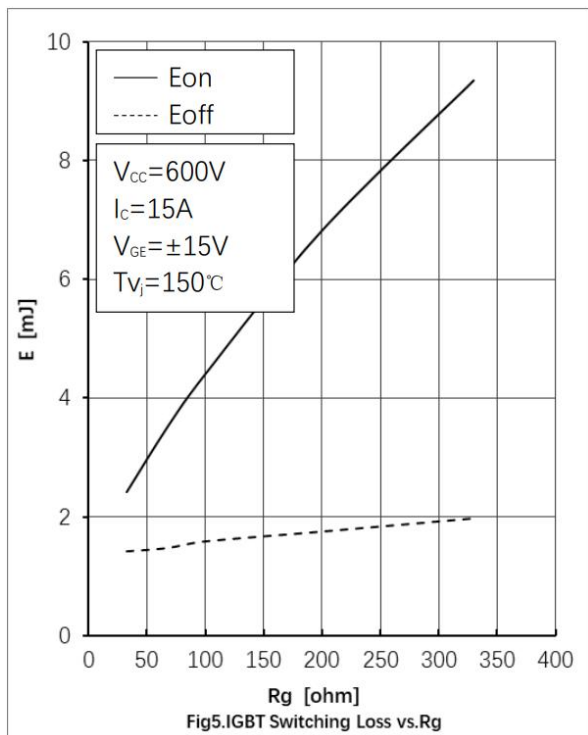
Electrical Characteristics of the DIODE ($T_j=25^\circ C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
V_{FM}	Diode Forward Voltage	$I_F=15A, T_j=25^\circ C$		2.00		V
		$I_F=15A, T_j=125^\circ C$		1.80		
		$I_F=15A, T_j=150^\circ C$		1.70		
I_{rr}	Reverse Recovery Current	$I_F=15A,$ $V_R=600V,$ $di/dt=-240A/\mu s,$ $T_j=25^\circ C$		7.5		A
Q_{rr}	Reverse Recovery Charge			1.8		uC
E_{rec}	Reverse Recovery Energy			0.60		mj
I_{rr}	Reverse Recovery Current	$I_F=15A,$ $V_R=600V,$ $di/dt=-240A/\mu s,$ $T_j=125^\circ C$		9		A
Q_{rr}	Reverse Recovery Charge			2.4		uC
E_{rec}	Reverse Recovery Energy			0.9		mj
I_{rr}	Reverse Recovery Current	$I_F=15A,$ $V_R=600V,$ $di/dt=-240A/\mu s,$ $T_j=150^\circ C$		9.5		A
Q_{rr}	Reverse Recovery Charge			2.6		uC
E_{rec}	Reverse Recovery Energy			1.0		mj

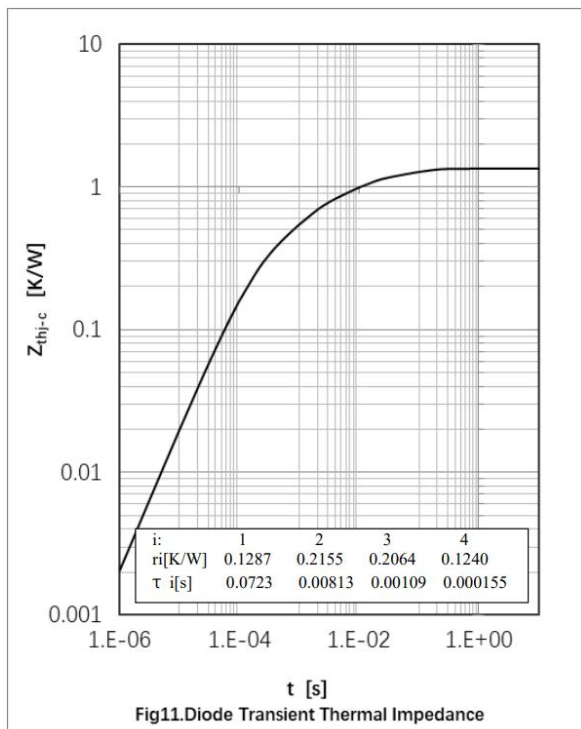
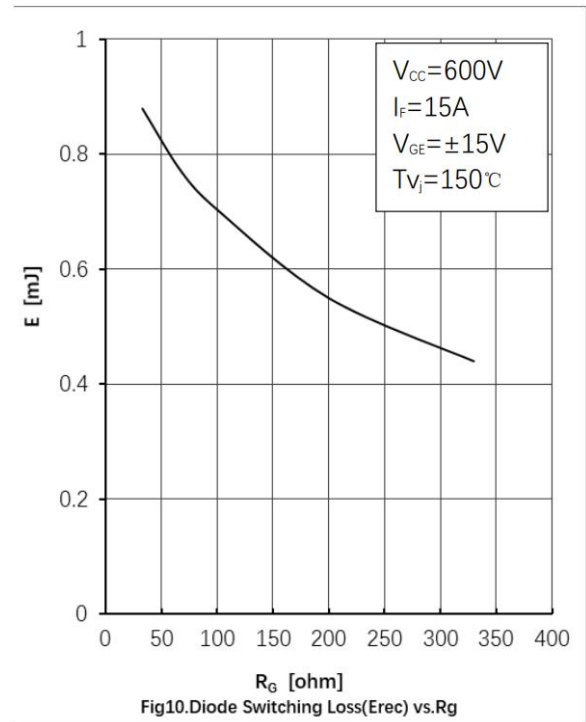
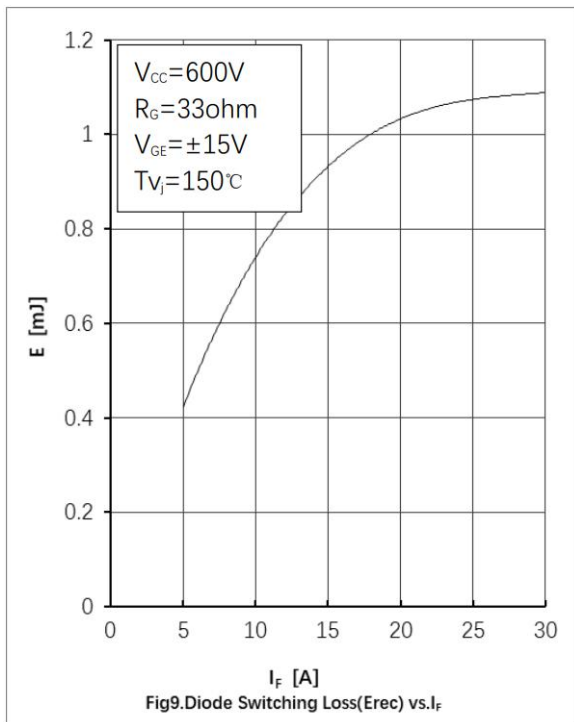
Typical Performance



Typical Performance

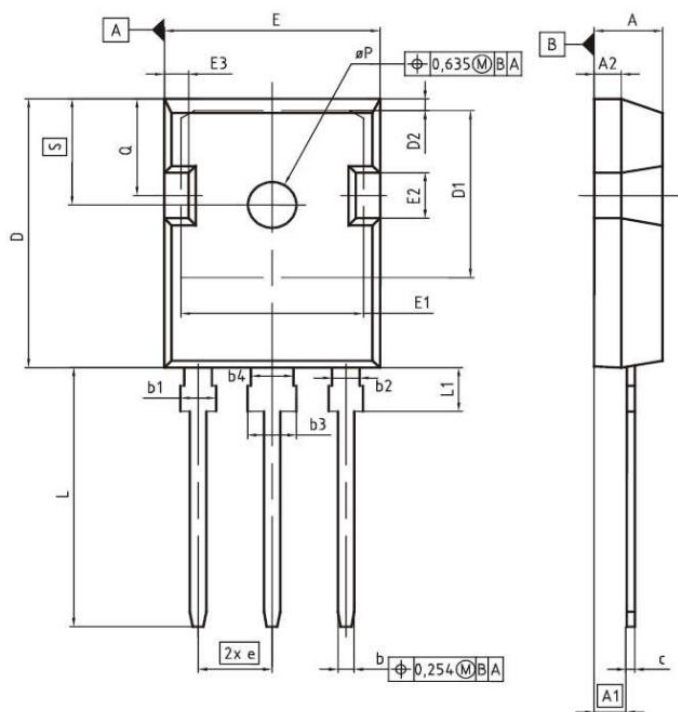


Typical Performance



Package Dimensions

TO-247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	5.44(BSC)		0.214(BSC)	
N	3		3	
L	19.80	20.32	0.780	0.800
L1	4.10	4.47	0.161	0.176
ΦP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248

UNIT:mm