

NCE N-Channel Enhancement Mode Power MOSFET

Description

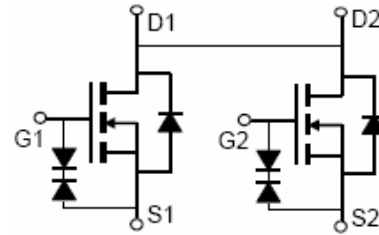
The NCE2011E uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

General Features

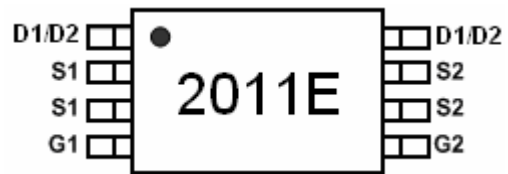
- $V_{DS} = 20V, I_D = 11A$
 $R_{DS(ON)} < 7m\Omega @ V_{GS} = 2.5V$
 $R_{DS(ON)} < 9m\Omega @ V_{GS} = 4.5V$
 ESD Rating: 2000V HBM
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

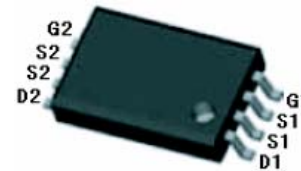
- PWM application
- Load switch



Schematic diagram



Marking and pin assignment



TSSOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2011E	NCE2011E	TSSOP-8	Ø330mm	12mm	3000 units

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 10	V
Drain Current-Continuous	I_D	11	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	44	A
Maximum Power Dissipation	P_D	1.6	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	78	$^\circ C/W$
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Electrical Characteristics ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	20		-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20V, V_{GS} = 0V$	-	-	1	μA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	± 10	μA
On Characteristics <small>(Note 3)</small>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.6	0.8	1.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=10A$	-	5.5	7	m Ω
		$V_{GS}=2.5V, I_D=5.5A$	-	7	9	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=11A$	25	-	-	S
Dynamic Characteristics <small>(Note4)</small>						
Input Capacitance	C_{iss}	$V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$	-	1710	-	PF
Output Capacitance	C_{oss}		-	232	-	PF
Reverse Transfer Capacitance	C_{rss}		-	200	-	PF
Switching Characteristics <small>(Note 4)</small>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L=1\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	2.5		nS
Turn-on Rise Time	t_r		-	7.2		nS
Turn-Off Delay Time	$t_{d(off)}$		-	49		nS
Turn-Off Fall Time	t_f		-	10.8		nS
Total Gate Charge	Q_g	$V_{DS}=10V, I_D=10A,$ $V_{GS}=4.5V$	-	17.5		nC
Gate-Source Charge	Q_{gs}		-	1.5	-	nC
Gate-Drain Charge	Q_{gd}		-	4.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <small>(Note 3)</small>	V_{SD}	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current <small>(Note 2)</small>	I_S		-	-	11	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

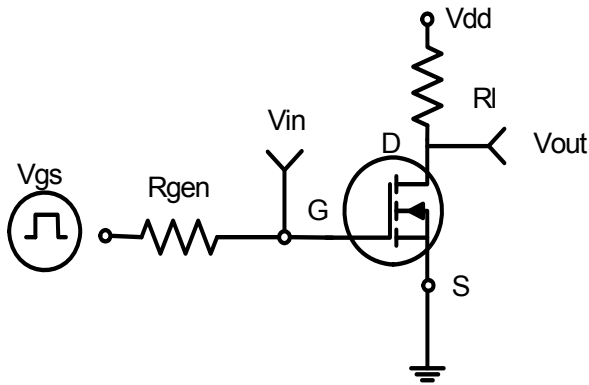


Figure 1: Switching Test Circuit

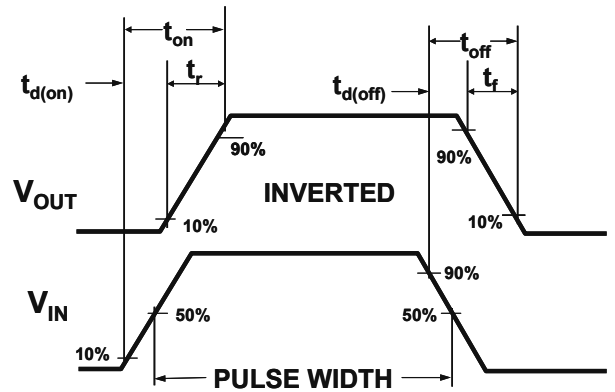


Figure 2: Switching Waveforms

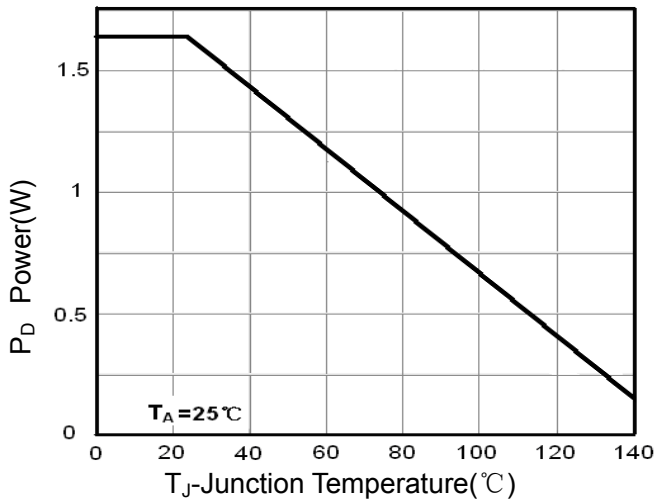


Figure 3 Power Dissipation

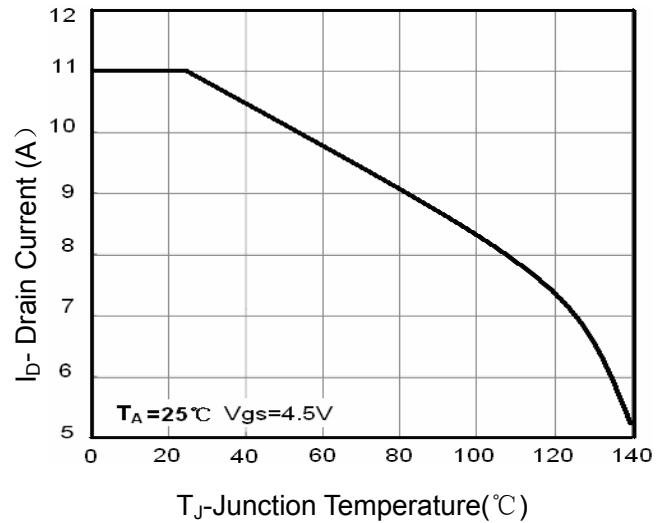


Figure 4 Drain Current

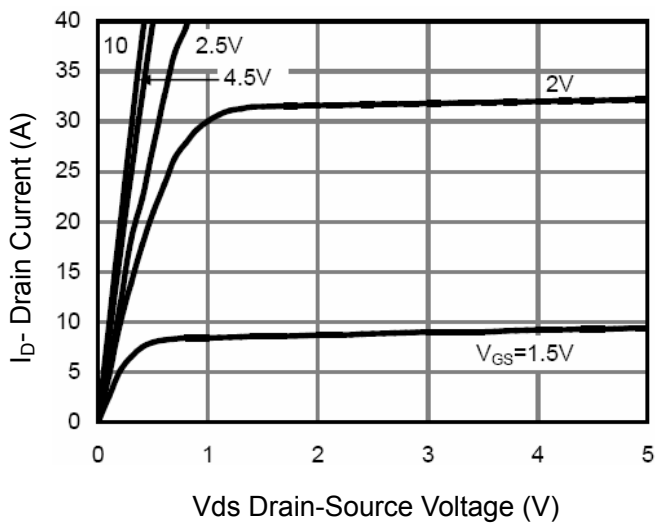


Figure 5 Output Characteristics

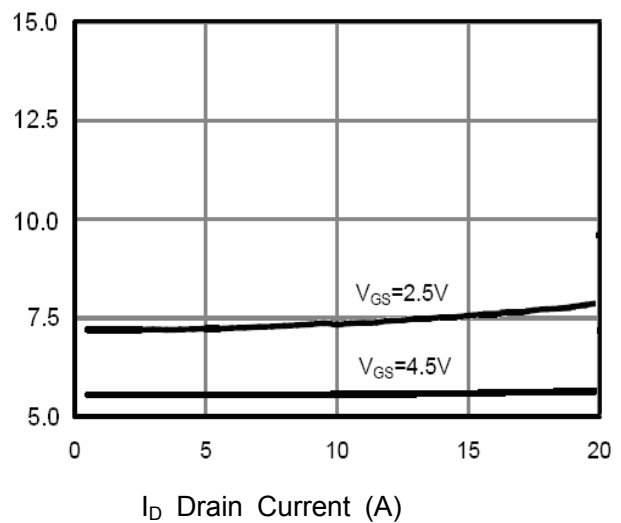


Figure 6 Drain-Source On-Resistance

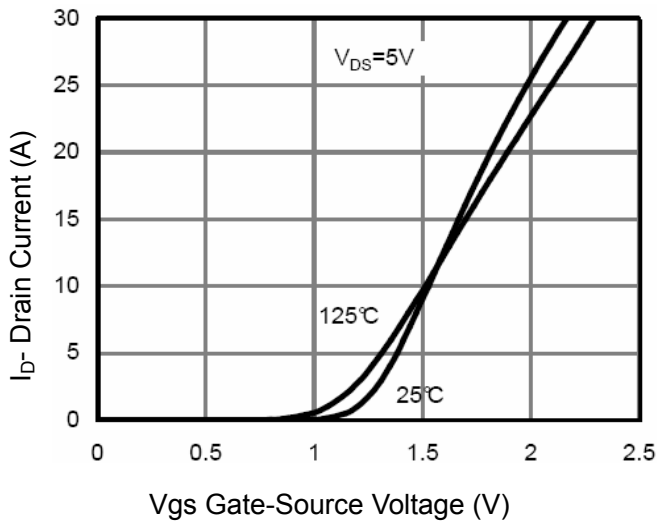


Figure 7 Transfer Characteristics

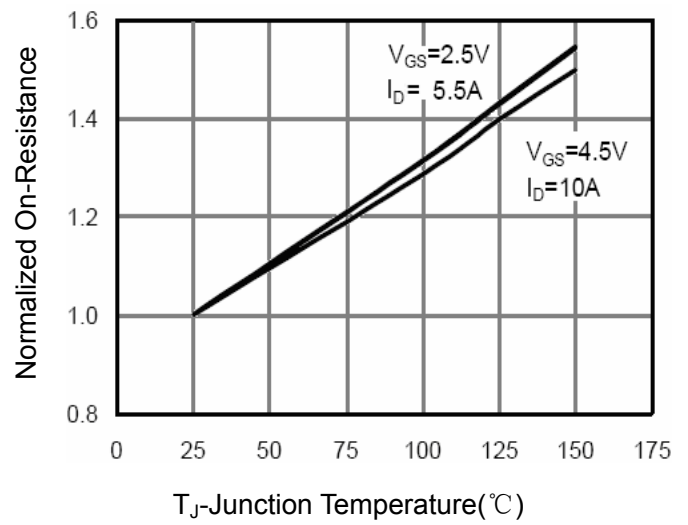


Figure 8 Drain-Source On-Resistance

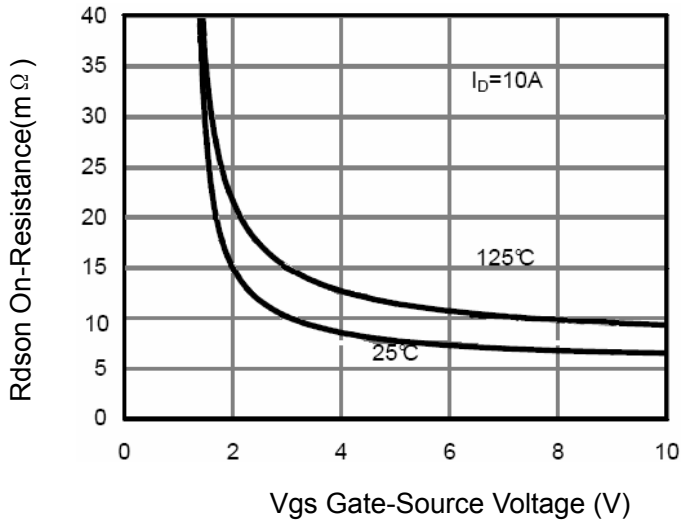


Figure 9 Rdson vs Vgs

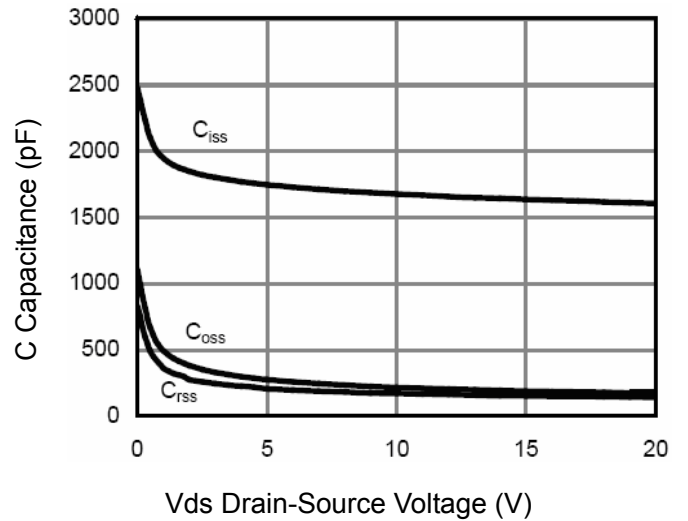


Figure 10 Capacitance vs Vds

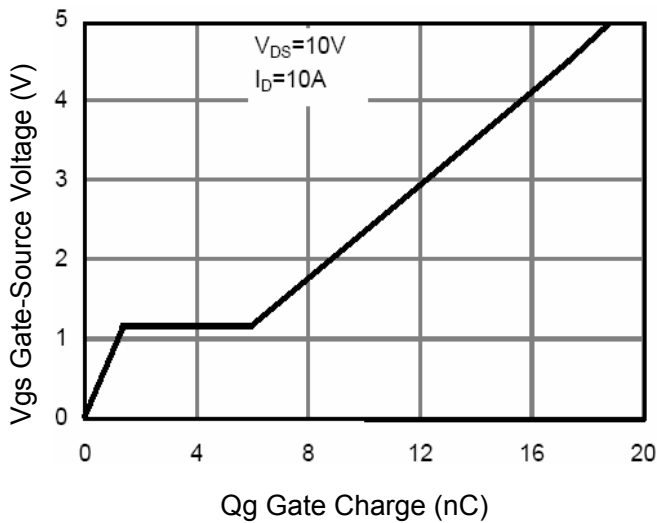


Figure 11 Gate Charge

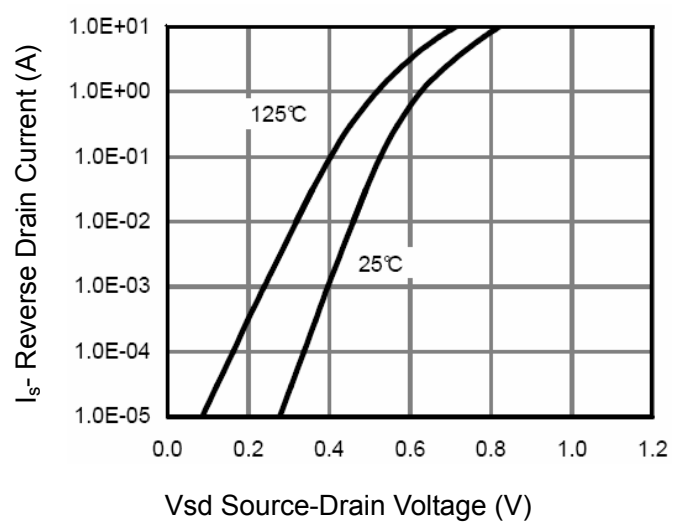


Figure 12 Source- Drain Diode Forward

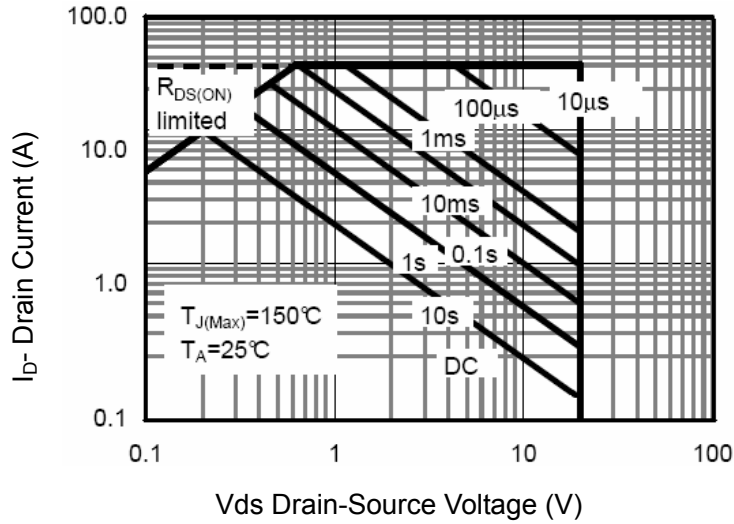


Figure 13 Safe Operation Area

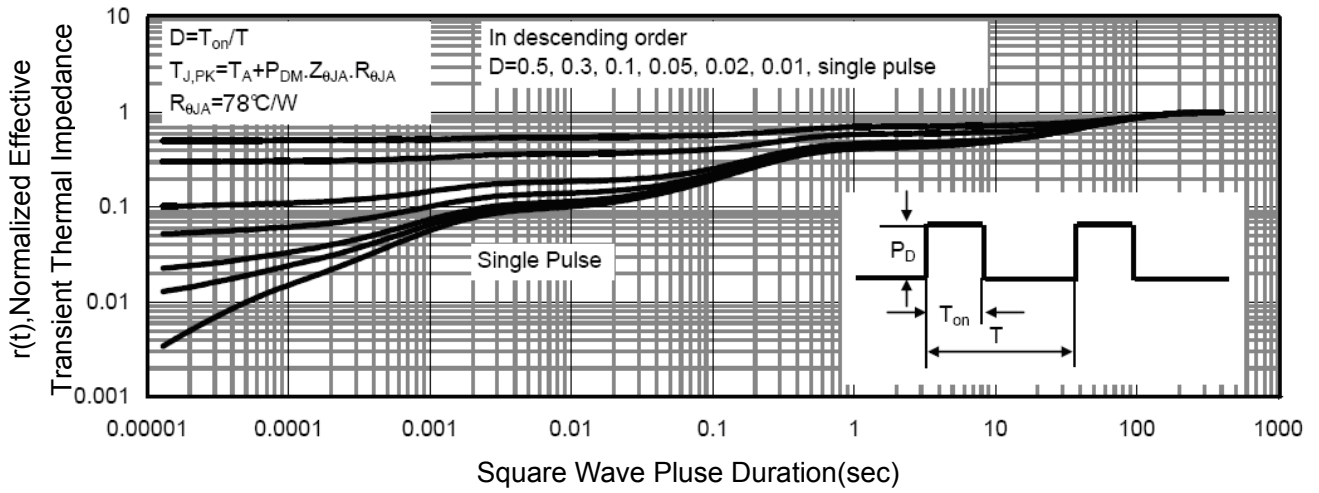
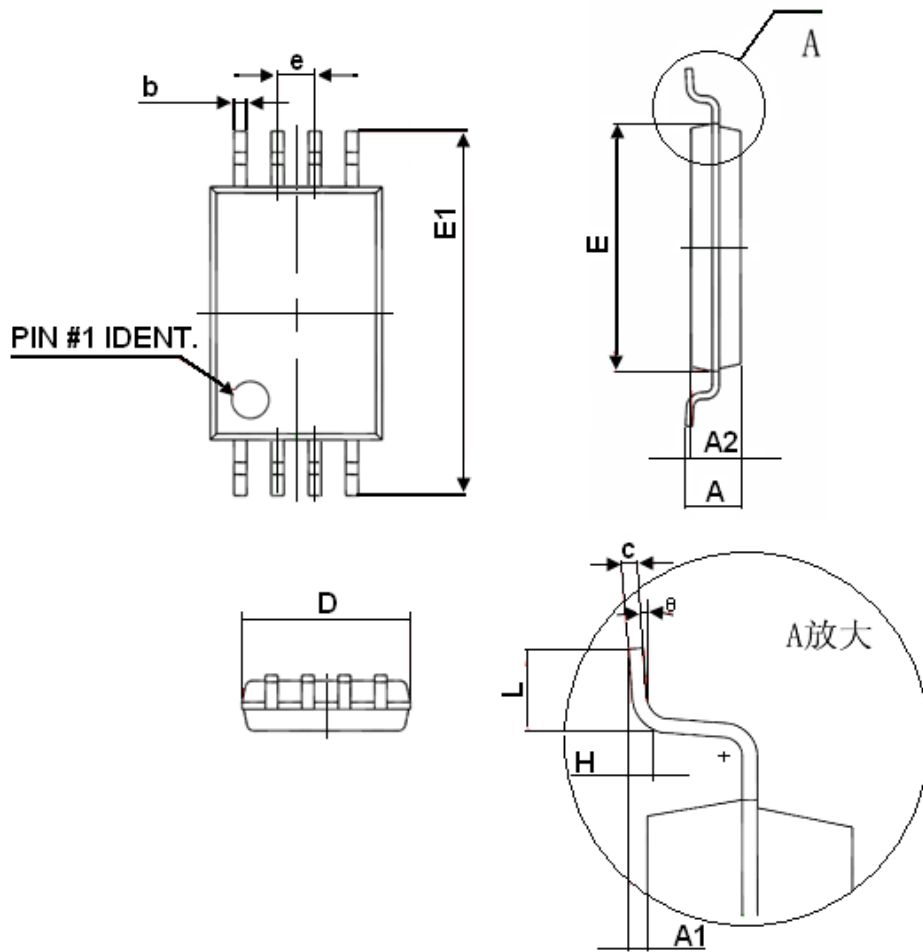


Figure 14 Normalized Maximum Transient Thermal Impedance

Tssop-8 Package Information



Symbol	Dimensions In Millimeters	
	Min	Max
D	2.900	3.100
E	4.300	4.500
b	0.190	0.300
c	0.090	0.200
E1	6.250	6.550
A		1.100
A2	0.800	1.000
A1	0.020	0.150
e	0.65(BSC)	
L	0.500	0.700
H	0.25(TYP)	
θ	1°	7°

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