N-Channel Enhancement Mode Power MOSFET

Description

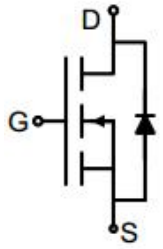
The G60N04K uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

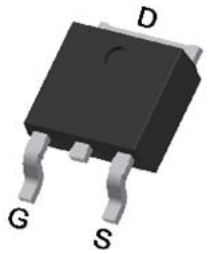
- V_{DS} 40V
- I_D (at V_{GS} = 10V) 60A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 7mΩ
- $R_{DS(ON)}$ (at V_{GS} = 4.5V) < 9mΩ
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-252

Ordering Information

Device	Package	Marking	Packaging
G60N04K	TO-252	G60N04	2500pcs/Reel

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Continuous Drain Current	T_C = 25ºC	I_D	60	A
	T_C = 100ºC		38	
Pulsed Drain Current (note1)		I_{DM}	240	A
Gate-Source Voltage		V_{GS}	±20	V
Power Dissipation		P_D	65	W
Single pulse avalanche energy （note2）		E_{AS}	56	mJ
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 To 150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	ºC/W
Thermal Resistance, Junction-to-Case	R_{thJC}	1.9	ºC/W

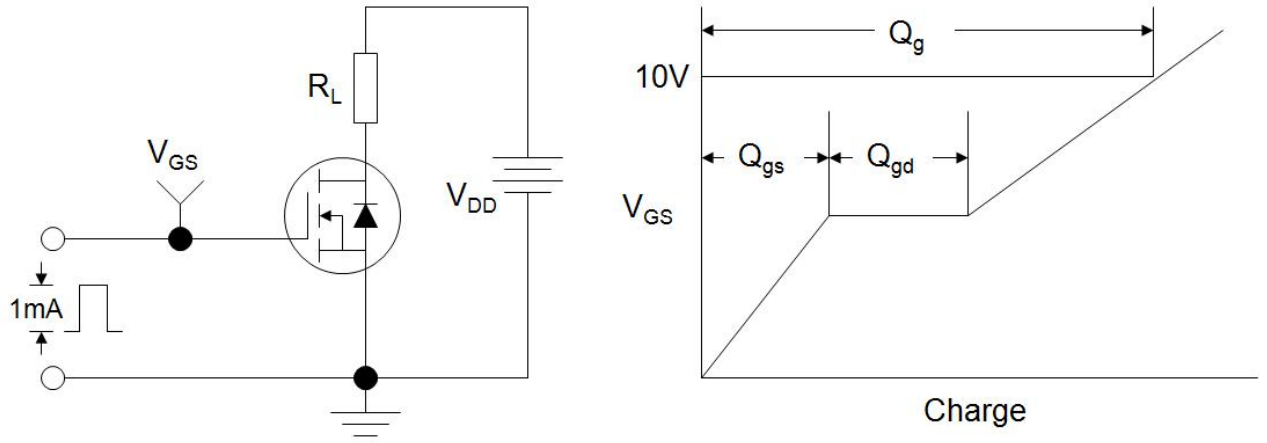
Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	40	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V, V_{GS} = 0V	--	--	1	μA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.1	1.7	2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 30A	--	5.5	7.0	mΩ
		V_{GS} = 4.5V, I_D = 20A	--	7.5	9.0	
Forward Transconductance	g_{FS}	V_{GS} = 5V, I_D = 30A	--	15	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1.0MHz	--	2350	--	pF
Output Capacitance	C_{oss}		--	170	--	
Reverse Transfer Capacitance	C_{rss}		--	153	--	
Total Gate Charge	Q_g	V_{DD} = 20V, I_D = 30A, V_{GS} = 10V	--	42	--	nC
Gate-Source Charge	Q_{gs}		--	7	--	
Gate-Drain Charge	Q_{gd}		--	9	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 20V, I_D = 30A, R_G = 3Ω	--	17	--	ns
Turn-on Rise Time	t_r		--	7	--	
Turn-off Delay Time	$t_{d(off)}$		--	30	--	
Turn-off Fall Time	t_f		--	17	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	60	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 30A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Qrr	I_F = 30A, V_{GS} = 0V di/dt=100A/us	--	29	--	nC
Reverse Recovery Time	Trr		--	26	--	ns

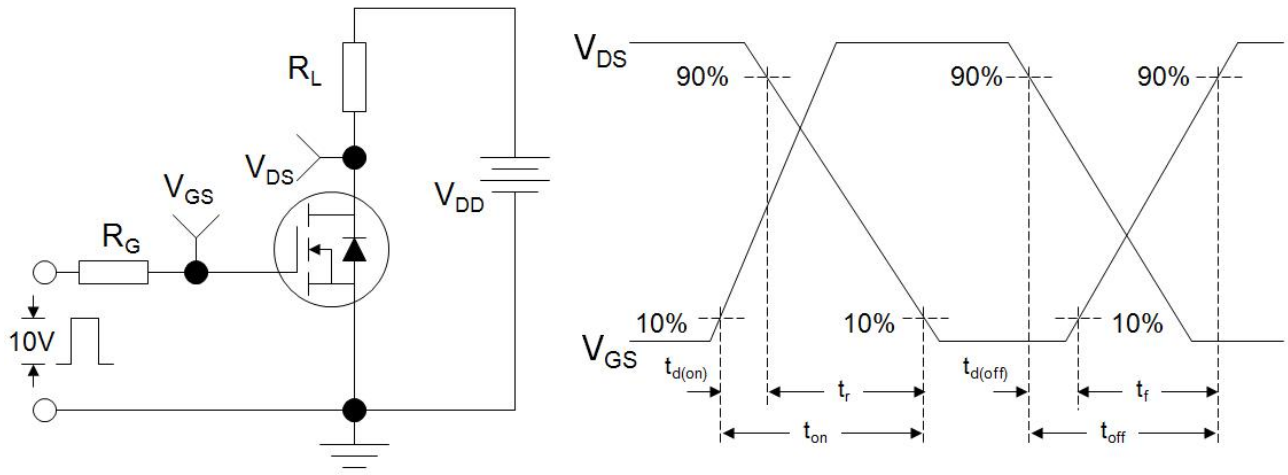
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=40V,VGS=10V,L=0.5mH,Rg=25Ω
   The table shows the minimum avalanche energy, which is 156mJ when the device is tested until failure
3. Identical low side and high side switch with identical R_G

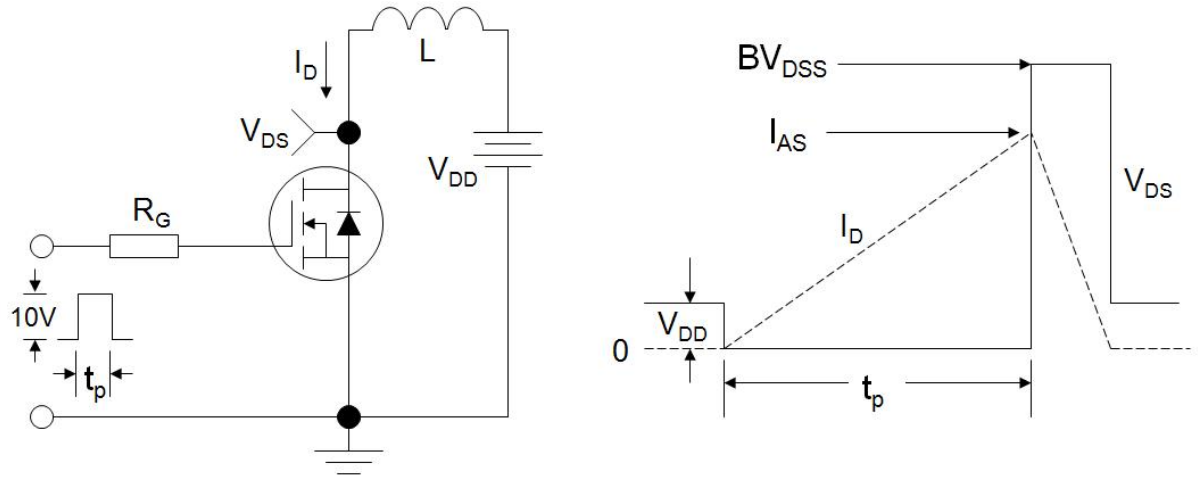
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

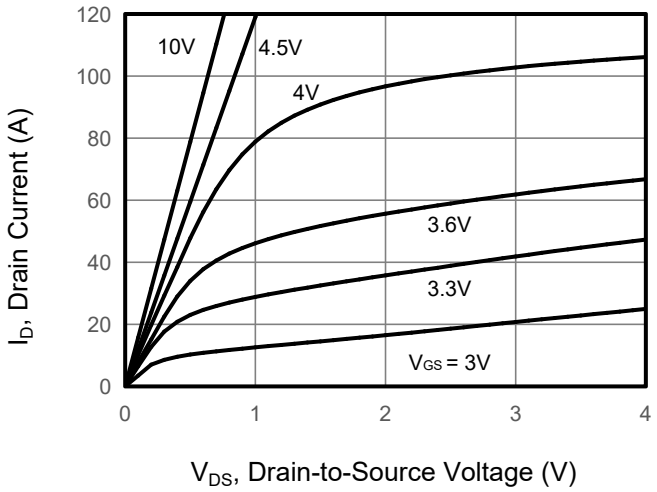


Figure 2. Transfer Characteristics

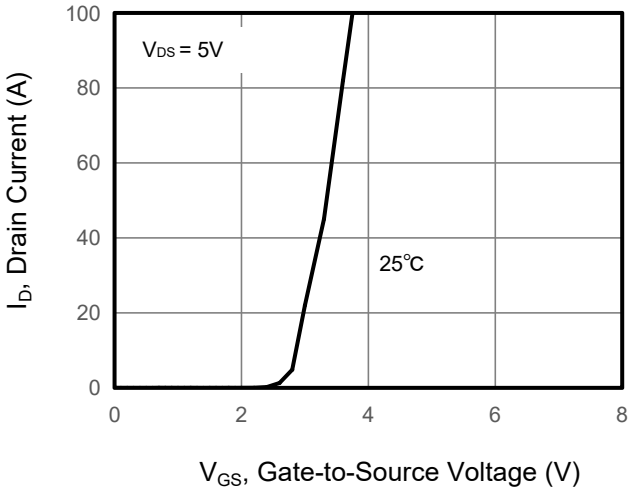


Figure 3. Drain Source On Resistance

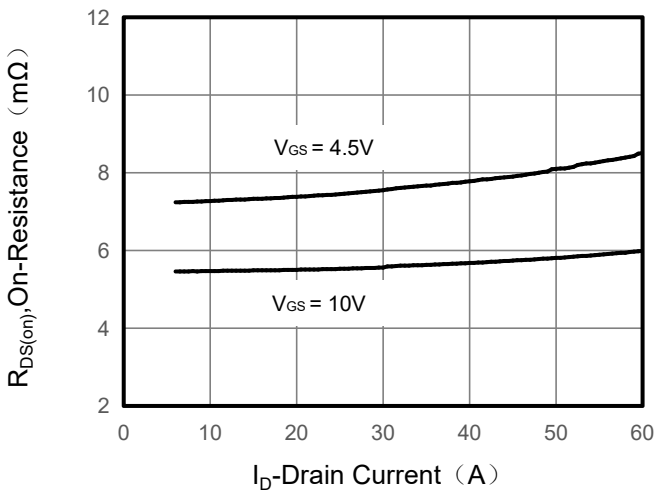


Figure 4. Gate Charge

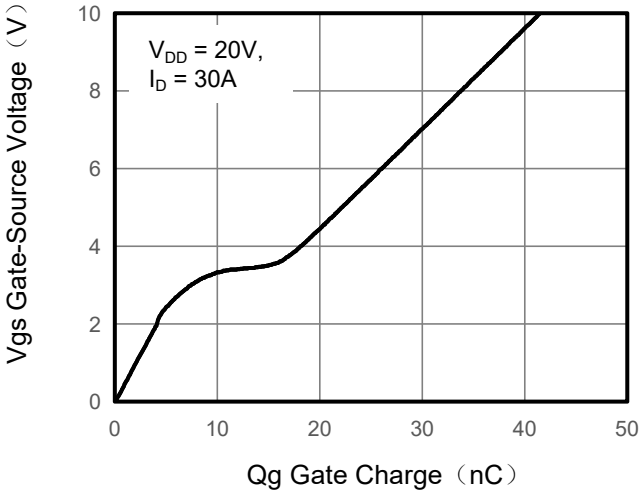


Figure 5. Capacitance

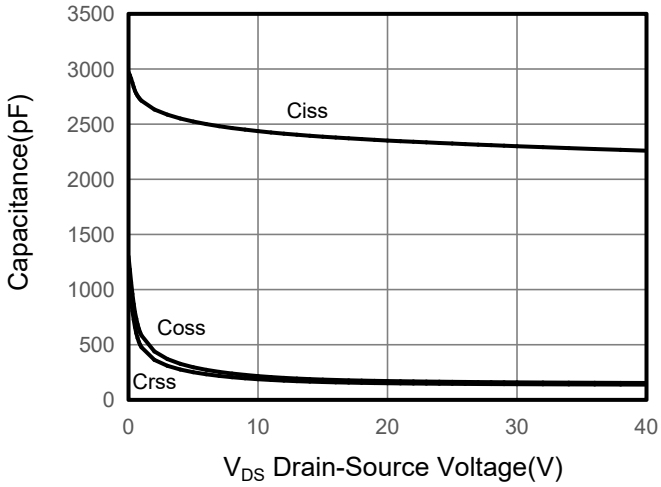
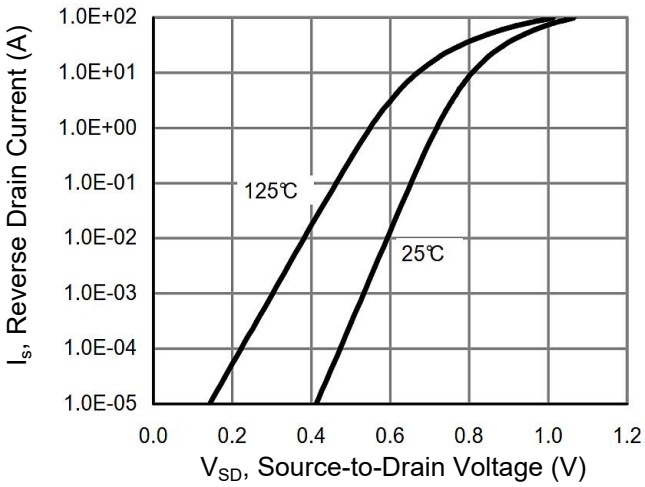


Figure 6. Source-Drain Diode Forward



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

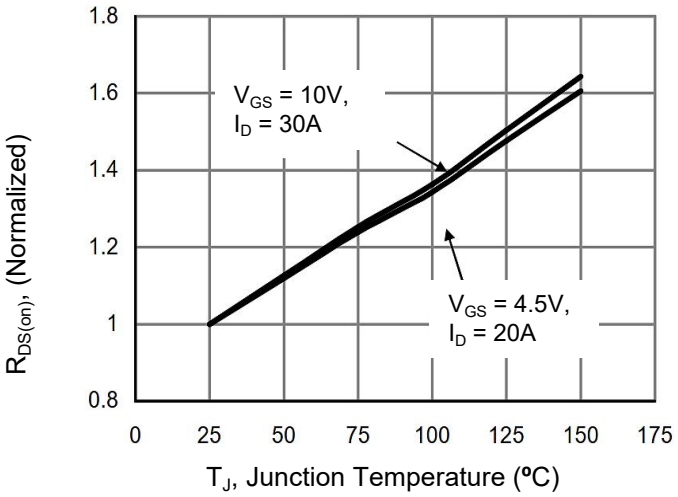


Figure 8. Safe Operation Area

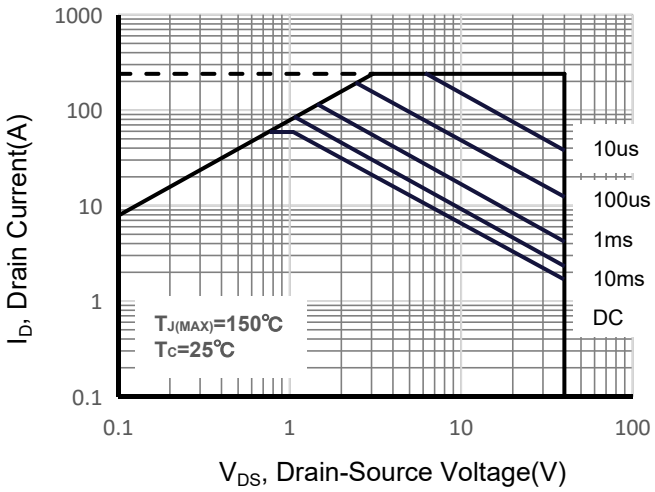


Figure 9. Maximum Continuous Drain Current vs Case Temperature

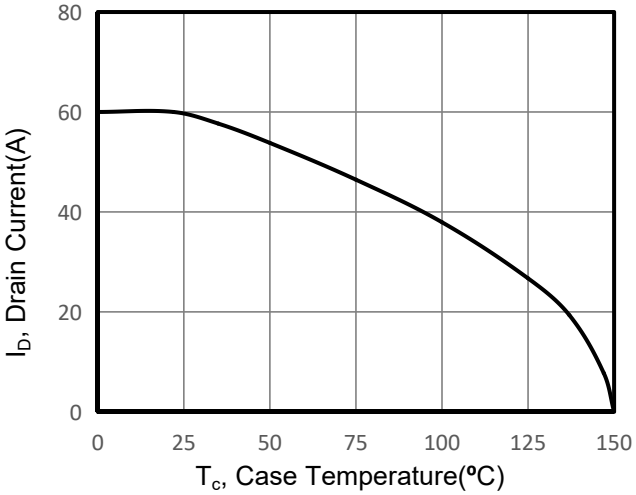
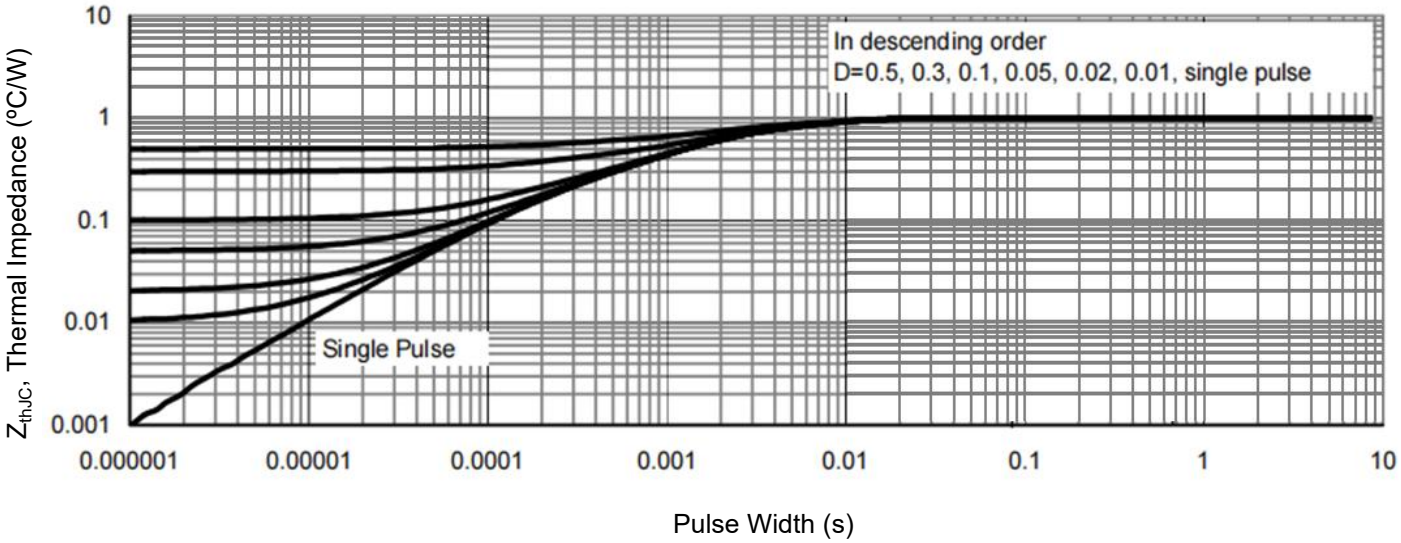
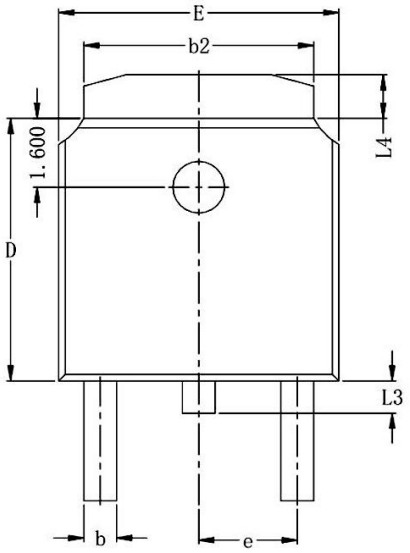


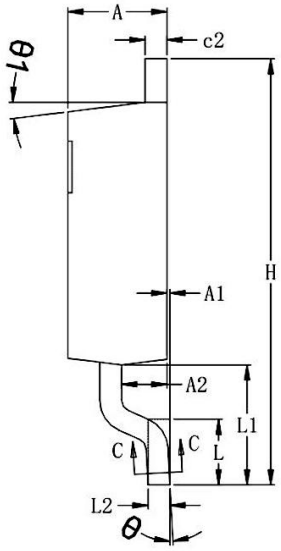
Figure 10. Normalized Maximum



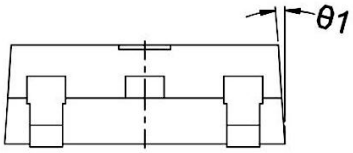
TO-252 Package Information



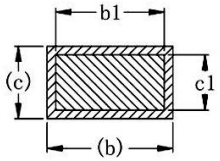
TOP VIEW



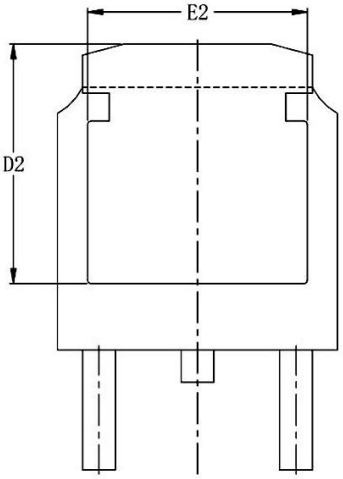
SIDE VIEW(Right)



SIDE VIEW(Front)



SECTION:C-C



OPTION 1

BOTTOM VIEW

DIM / SYMBOL	MIN.	NOM.	MAX.	DIM / SYMBOL	MIN.	NOM.	MAX.
A	2.200	2.300	2.400	E	6.400	6.500	6.600
A1	0.000	0.070	0.130	E2	4.900	5.100	5.300
A2	0.950	1.050	1.150	e		2.286 BSC.	
b	0.700	0.800	0.900	H	9.700	9.900	10.100
b1	0.660	0.760	0.860	L	1.380	1.525	1.725
b2	5.134	5.334	5.534	L1	2.588	2.788	2.988
c	0.448	0.548	0.648	L2		0.508 BSC.	
c1	0.458	0.508	0.558	L3	0.600	0.750	0.950
c2	0.448	0.548	0.648	L4	0.812	1.012	1.212
D	6.000	6.100	6.200	θ	1°	3°	5°
D2	5.372	5.572	5.772	θ1	6°	7°	8°

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