1200V N-Channel MOSFET

FEATURES

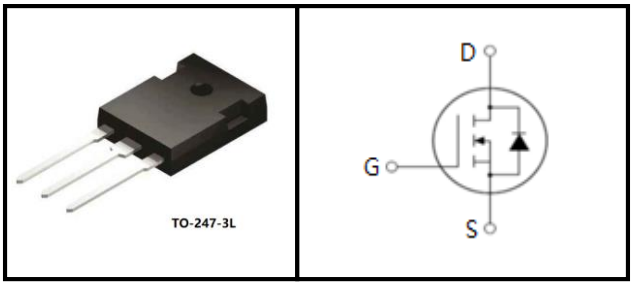
- Low On-Resistance
- Low Capacitance
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

BENEFITS

- Higher System Efficiency
- Parallel Device Convenience
- High Temperature Application
- High Frequency Operation

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Power Factor Correction (PFC)
- Uninterruptible Power Supply (UPS)
- EV Charging station & Motor Drives
- Solar/ Wind Renewable Energy
- Power Inverters & DC/DC Converters



Device Marking and Package Information

Device	Package	Marking
C2M120W080	TO-247-3L	C2M120W080

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value	Unit
Drain-Source Voltage	V_{DSS}	VGS=0V, IDS=100μA	1200	V
Continuous Drain Current	I_D	VGS=20V, TC=25° C	36	A
		VGS=20V, TC=110° C	22	
Pulsed Drain Current	I_{DM}	t_{PW} limitation per Fig.17	138	
Single Pulse Avalanche Energy	E_{AS}	VDD=100V, ID=10A	1250	mJ
Power Dissipation	P_D	TC=25° C	208	W
Recommend Gate Source Voltage	$V_{GS, op}$		-5/+20	V
Maximum Gate Source Voltage	$V_{GS, max}$		-10/+25	
Soldering Temperature	T_L		260	ºC
Operating Junction and Storage Temperature Range	T_J, T_{stg}		-55/+150	

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 = 100μA	1200	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200V, V_{GS} = 0V, T_J = 25ºC	--	<1	50	μA
		V_{DS} = 1200V, V_{GS} = 0V, T_J = 150ºC	--	5	200	
Gate-Source Leakage	I_{GSS}	V_{GS} = 20V， V_{DS} = 0V	--	--	250	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = 10V, I_D = 10mA	--	2.4	--	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 20V, I_D = 18A	--	80	96	mΩ
		VGS = 20V, ID = 18A, TJ = 150ºC	--	105	--	
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 800V, f = 1.0MHz V_{AC}=25mV	--	1303	--	pF
Output Capacitance	C_{oss}		--	367	--	
Reverse Transfer Capacitance	C_{rss}		--	53	--	
Effective Output Capacitance, Energy Related	$C_{o(er)}$	V_{GS}=0V, V_{DS}=0 to 800V		131		
Effective Output Capacitance, Time Related	$C_{o(tr)}$	I_D=const., V_{GS}=0V, V_{DS}=0 to 800V		180		
Total Gate Charge	Q_g	V_{DD} = 800V, I_D= 18A, V_{GS}= -5 to 20V	--	96	--	nC
Gate-Source Charge	Q_{gs}		--	15	--	
Gate-Drain Charge	Q_{gd}		--	45	--	
Gate plateau voltage	Vpl		--	11.2	--	V
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=800V, V_{GS}=-4/20V, I_D=18A, R_L=40Ω, $R_{G(ext)}$= 2.7 Ω	--	55.5	--	ns
Turn-on Rise Time	t_r		--	153	--	
Turn-off Delay Time	$t_{d(off)}$		--	112	--	
Turn-off Fall Time	t_f		--	91	--	
Coss Stored Energy	Eoss	V_{GS}=0V, V_{DS}=800V f =1MHz, V_{AC}=25mV	--	58*	--	μJ
Turn-on Switching Energy	Eon	V_{DS}=800V, V_{GS}=0/20V, I_D=18A, $R_{G(ext)}$= 2.7 Ω	--	115*	--	
Turn-off Switching Energy	Eoff		--	165*	--	
Internal Gate Resistance	$R_{G(int.)}$	f =1MHz, V_{AC}=25mV	--	5.6	--	Ω

*The energy loss caused by the reverse recovery of FWD is not included in Eon.

Specifications T_J = 25ºC, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Built-in SiC Diode Characteristics						
Continuous Diode Forward Current	I_S	VGS=-5V, TC=25° C	--	33	--	A
Inverse Diode Forward Voltage	V_{SD}	I_S = 10.8A, V_{GS} = -5V	--	5.4	--	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V, I_F = 18A, V_{DS}=800V, di_F/dt =300A /µs	--	40	--	ns
Reverse Recovery Charge	Q_{rr}		--	43	--	nC
Peak Reverse Recovery Current	Irrm		--	1.8	--	A

Thermal Resistance			
Parameter	**Symbol**	**Value**	**Unit**
Thermal Resistance, Junction-to-Case	R_{thJC}	0.6	K/W

Typical Device Performance

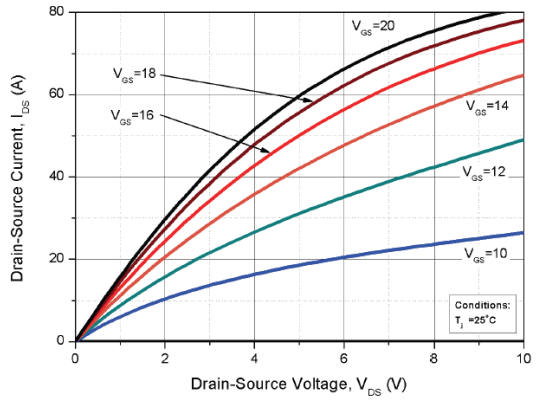


Fig. 1 Forward Output Characteristics at T_j = 25°C

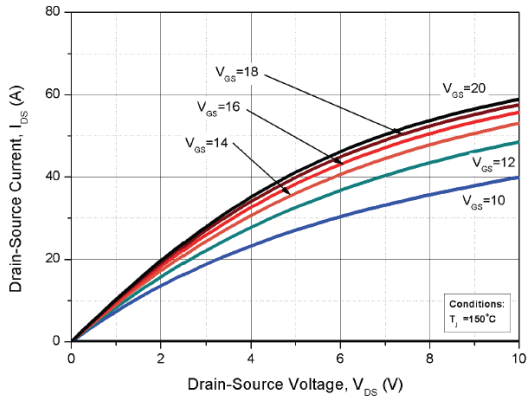


Fig. 2 Forward Output Characteristics at T_j = 150°C

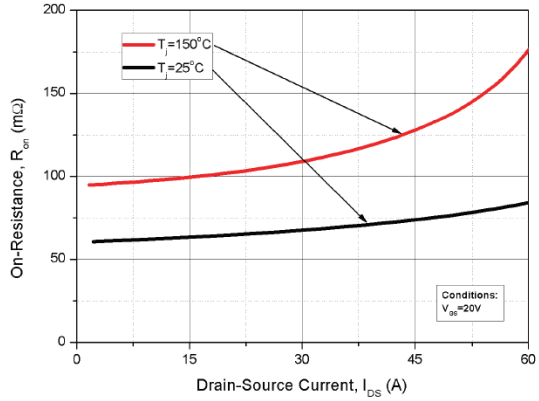


Fig. 3 On-Resistance vs. Drain Current for Various T_j

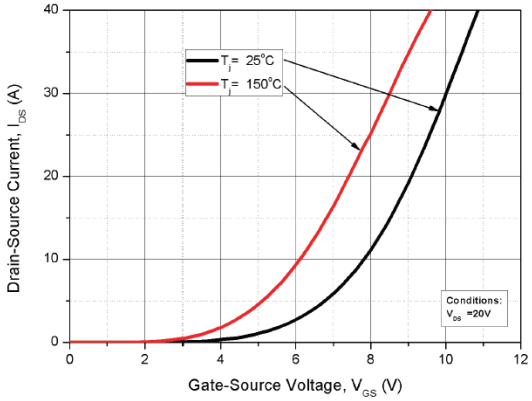


Fig. 4 Transfer Characteristics for Various T_j

Typical Device Performance

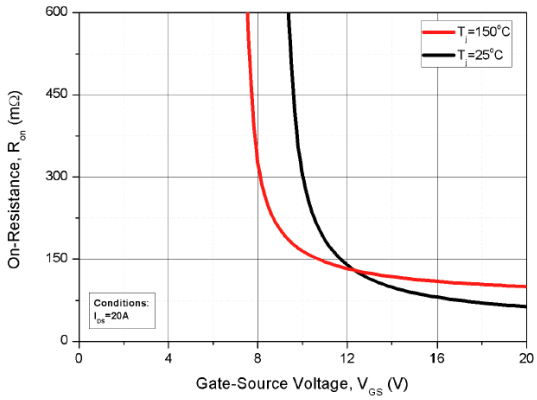


Fig. 5 On-Resistance vs. Gate Voltage for Various T_j

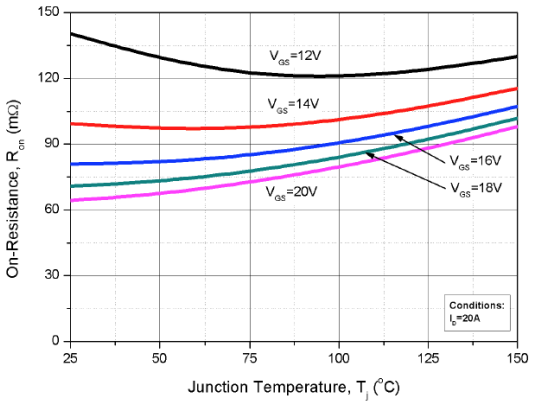


Fig. 6 On-Resistance vs. Temperature for Various Gate Voltage

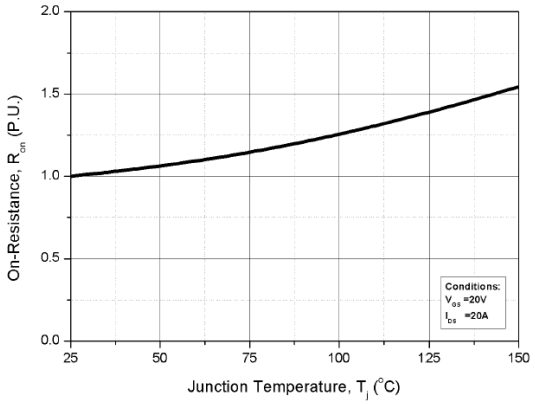


Fig. 7 Normalized On-Resistance vs. Temperature

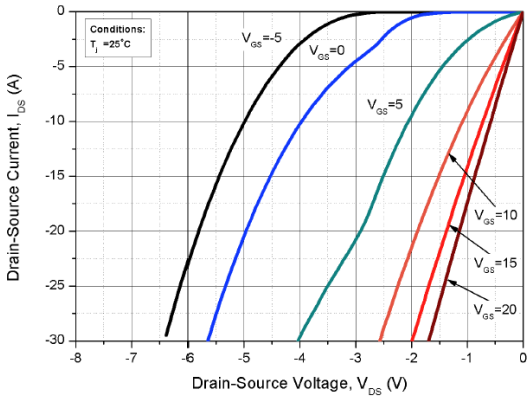


Fig. 8 Reverse Output Characteristics at T_j = 25°C

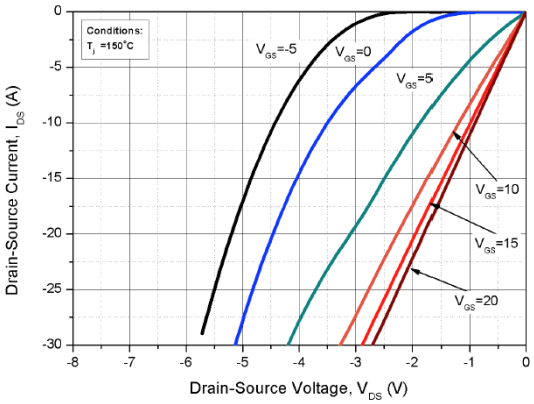


Fig. 9 Reverse Output Characteristics at T_j = 150°C

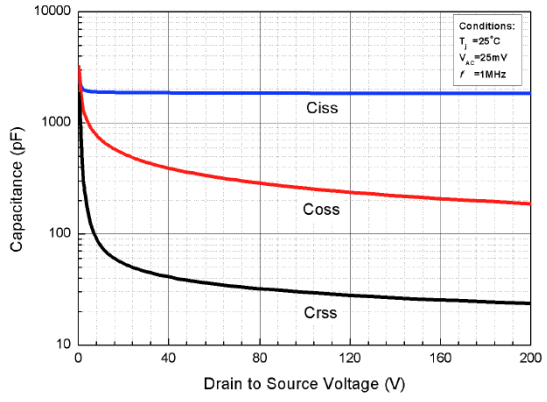


Fig. 10 Capacitances vs. Drain to Source Voltage (0 - 200V)

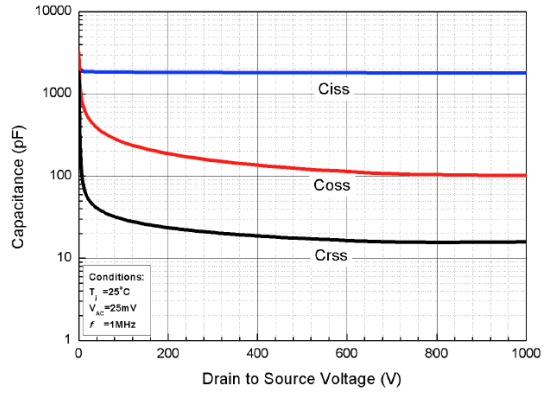


Fig. 11 Capacitances vs. Drain to Source Voltage (0 - 1000V)

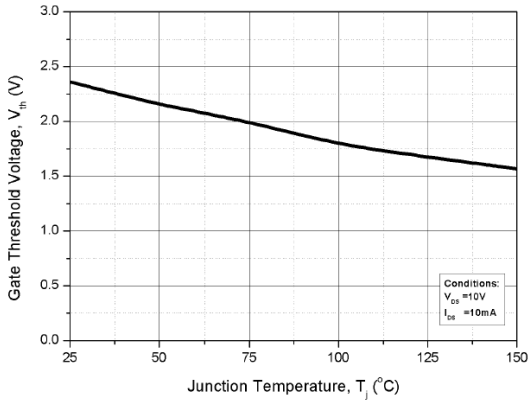


Fig. 12 Threshold Voltage vs. Temperature

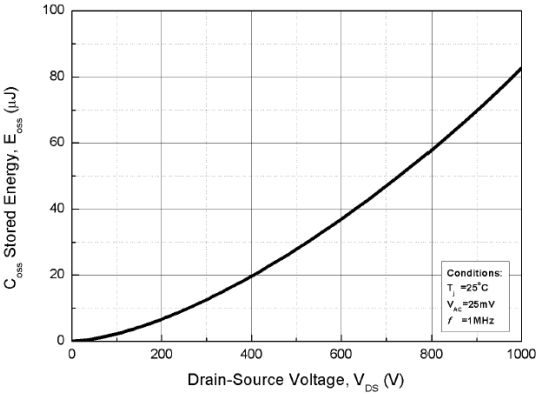


Fig. 13 Output Capacitor Stored Energy*

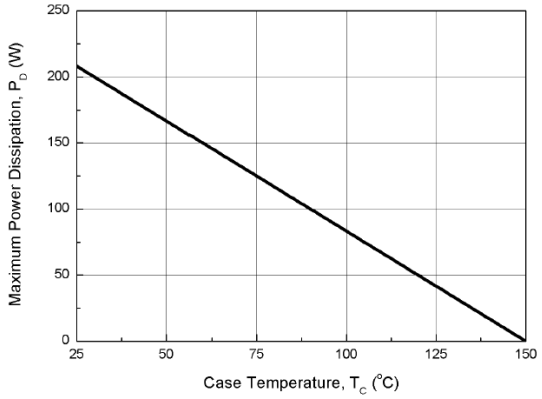


Fig. 14 Maximum Power Dissipation Derating vs. Case Temperature

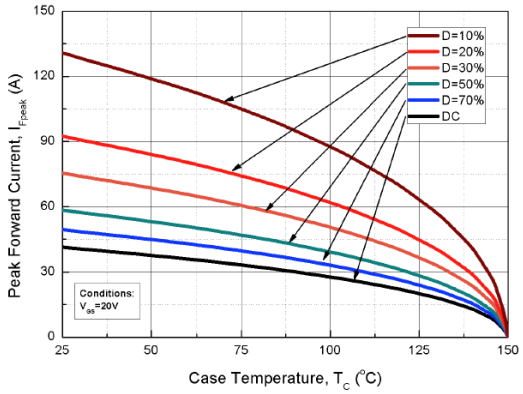


Fig. 15 Drain Current Derating vs. Case Temperature

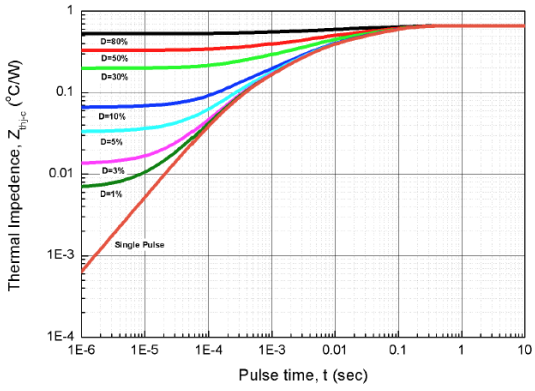


Fig. 16 Transient Junction to Case Thermal Impedance

Typical Device Performance

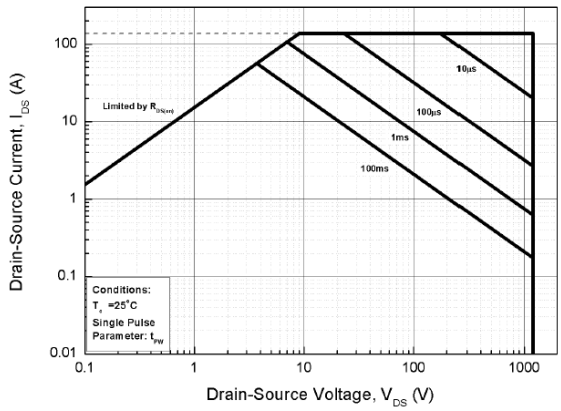


Fig. 17 Safe Operating Area

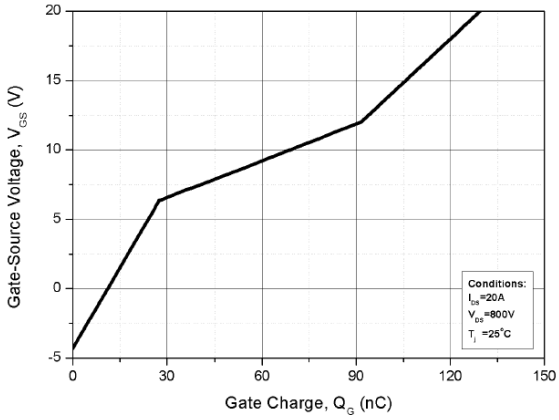


Fig. 18 Gate Charge Characteristics

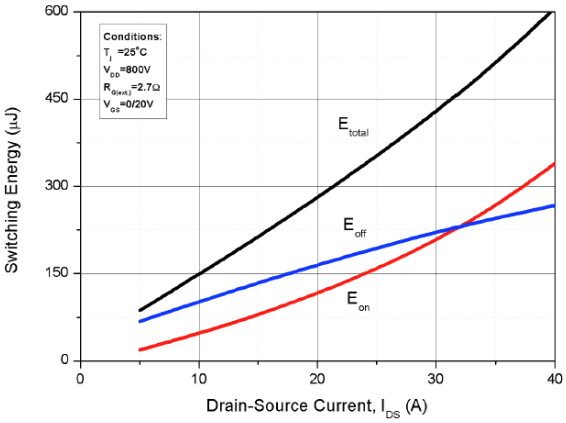


Fig. 19 Clamped Inductive Switching Energy vs. Drain Current (V_{DD}=800V)*

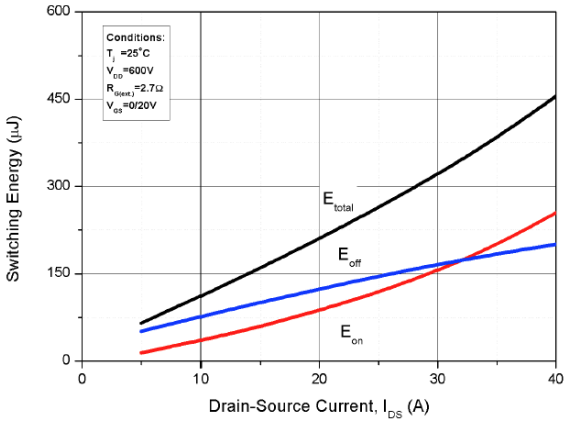


Fig. 20 Clamped Inductive Switching Energy vs. Drain Current (V_{DD}=600V)*

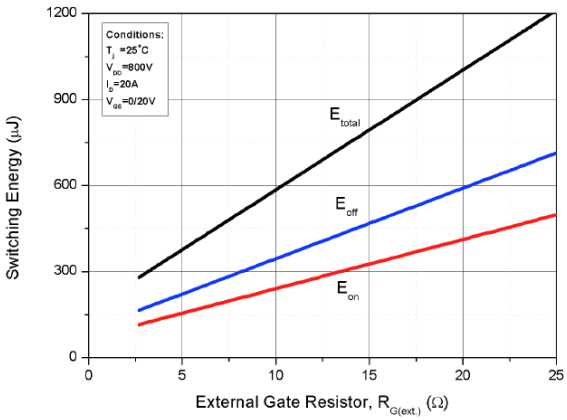
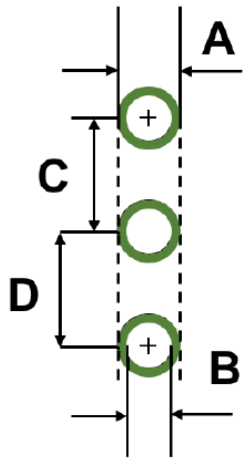


Fig. 21 Clamped Inductive Switching Energy vs. External Gate Resistor ($R_{G(ext.)}$)*

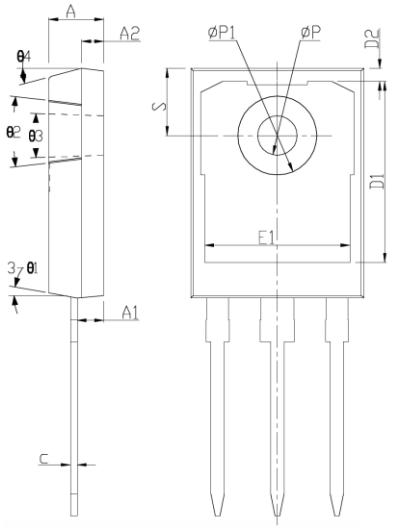
*Base on the results of calculation, note that the energy loss caused by the reverse recovery of FWD is not included in Eon.

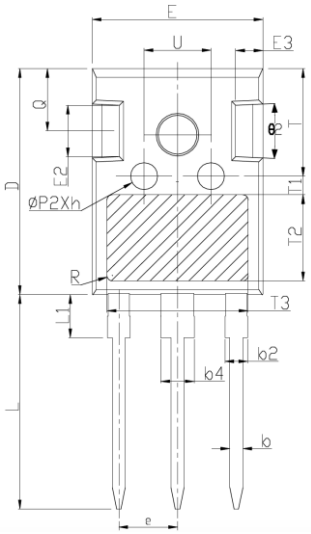
Recommended Solder Pad Layout (TO-247-3L)



Mechanical Parameters			
Parameter	Symbol	Typical	Unit
Length	A	3.048	mm
	B	2.032	
	C	5.436	
	D	5.436	

Mechanical Parameters





NOTES:
1.All dimensions are in mm.
2.Tolerance: ±0.05mm.

SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	4.75	5.00	5.25
A1	2.16	2.41	2.66
A2	1.85	2.00	2.15
b	1.11	1.21	1.35
b2	1.90	2.01	2.25
b4	2.90	3.01	3.25
c	0.51	0.61	0.75
D	20.60	21.00	21.40
D1	16.15	16.55	16.95
D2	1.00	1.20	1.40
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.70	5.00	5.30
E3	2.25	2.50	2.75
e	5.44BSC		
h	0.00	0.10	0.25
L	19.52	19.92	20.32
L1	-	-	4.30
ΦP	3.35	3.60	3.85
ΦP1	-	-	7.30
ΦP2	2.25	2.50	2.75
Q	5.50	5.80	6.10
S	6.15BSC		
R	0.50REF		
T	9.70	-	10.30
T1	1.65REF		
T2	8.00REF		
T3	12.80REF		
U	5.90	-	6.50
θ1	4°	7°	10°
θ2	2°	5°	8°
θ3	1°	-	2°
θ4	10°	15°	20°

*The information provided herein is subject to change without notice.

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