N-Channel Enhancement Mode Power MOSFET

Description

The GC040N65QFA uses advanced super junction technology and design to provide excellent Ros(on), low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

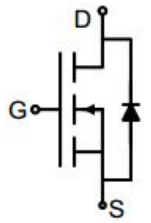
AEC-Q101 Qualified

General Features

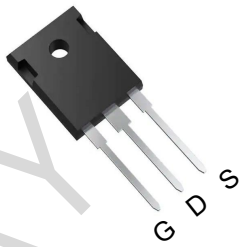
- V_{DS} 650V
- I_D (at V_{GS} = 10V) 72A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 42mΩ
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-247

PRELIMINARY

Ordering Information

Device	Package	Marking	Packaging
GC040N65QFA	TO-247	GC040N65F	30pcs/Tube

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Continuous Drain Current	T_C = 25ºC	I_D	72	A
	T_C = 100ºC		45	
Pulsed Drain Current (note1)		I_{DM}	216	A
Gate-Source Voltage		V_{GS}	±30	V
Power Dissipation		P_D	496	W
Single pulse avalanche energy （note2）		E_{AS}	1000	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}	46	ºC/W
Maximum Junction-to-Case	R_{thJC}	0.25	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	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V, V_{GS} = 0V	--	--	5	μA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	3.2	--	4.6	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 35A	--	36	42	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 20V, I_D = 35A	--	51	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 100V, f = 100KHz	--	4900	--	pF
Output Capacitance	C_{oss}		--	265	--	
Reverse Transfer Capacitance	C_{rss}		--	1.6	--	
Total Gate Charge	Q_g	V_{DD} = 480V, I_D = 35A, V_{GS} = 10V	--	158	--	nC
Gate-Source Charge	Q_{gs}		--	41	--	
Gate-Drain Charge	Q_{gd}		--	90	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 400V, I_D = 35A, R_G = 27Ω	--	128	--	ns
Turn-on Rise Time	t_r		--	112	--	
Turn-off Delay Time	$t_{d(off)}$		--	400	--	
Turn-off Fall Time	t_f		--	93	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	72	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 35A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Qrr	I_F = 35A, V_{GS} = 0V di/dt=100A/us	--	0.81	--	μC
Reverse Recovery Time	Trr		--	130	--	ns

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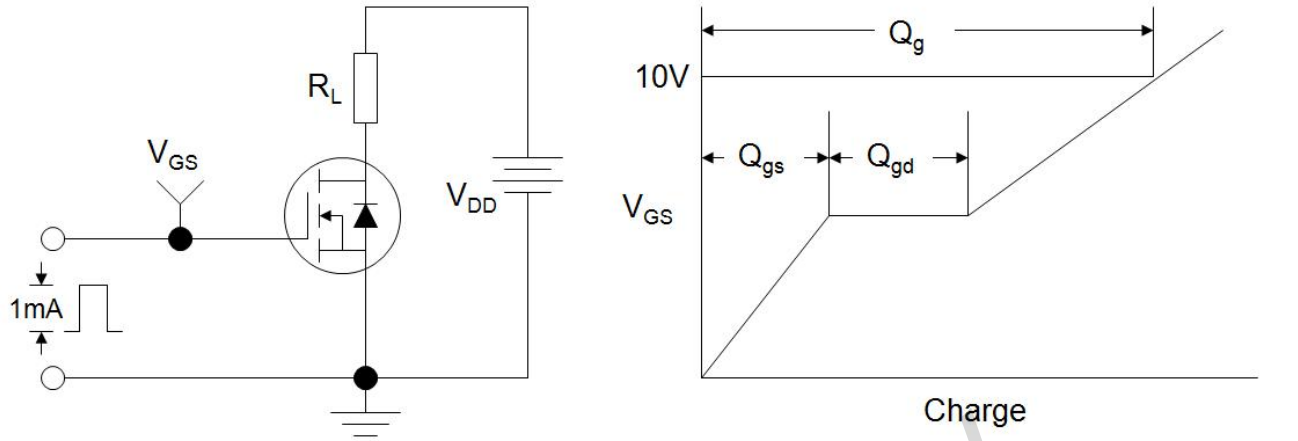
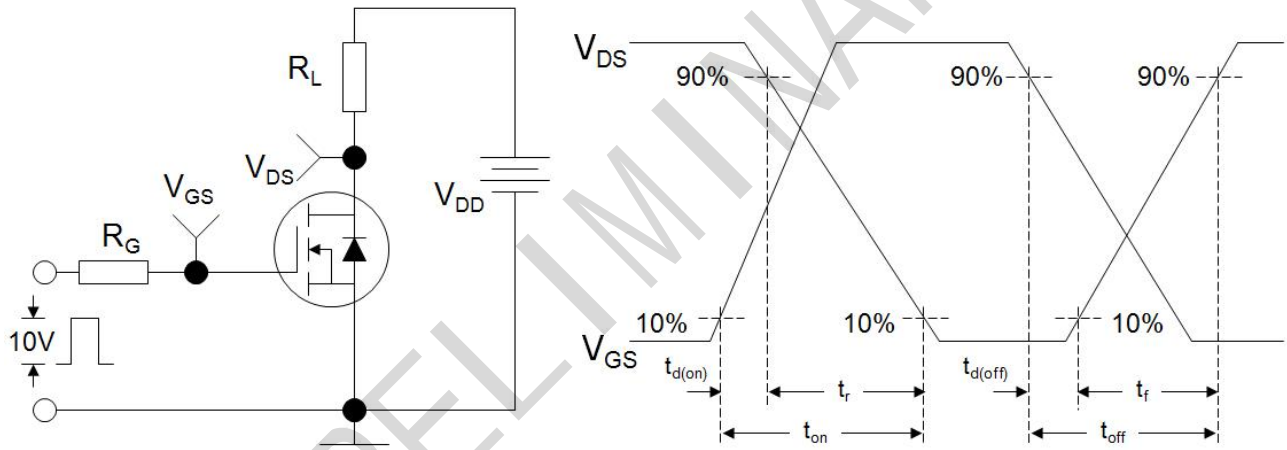
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=50V,VGS=10V,L=30mH,Rg=25Ω
3. Identical low side and high side switch with identical R_G

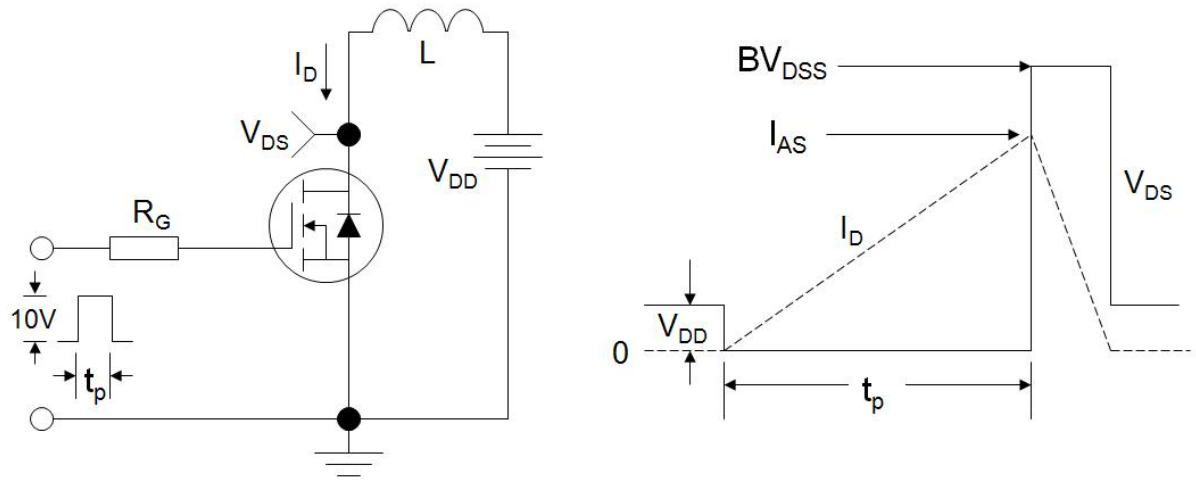
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

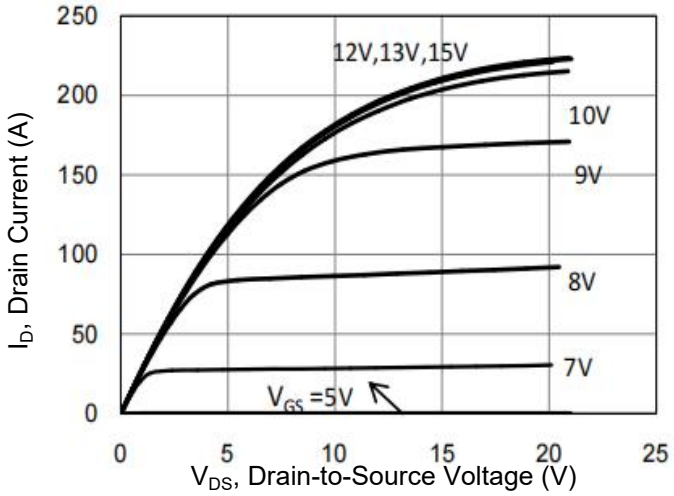


Figure 2. Transfer Characteristics

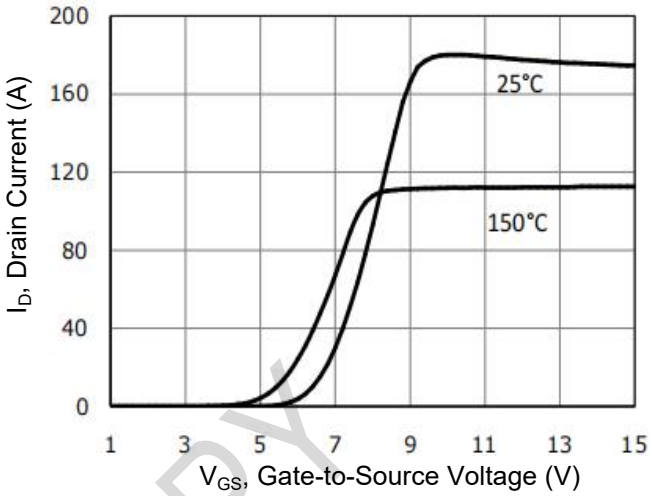


Figure 3. Drain Source On Resistance

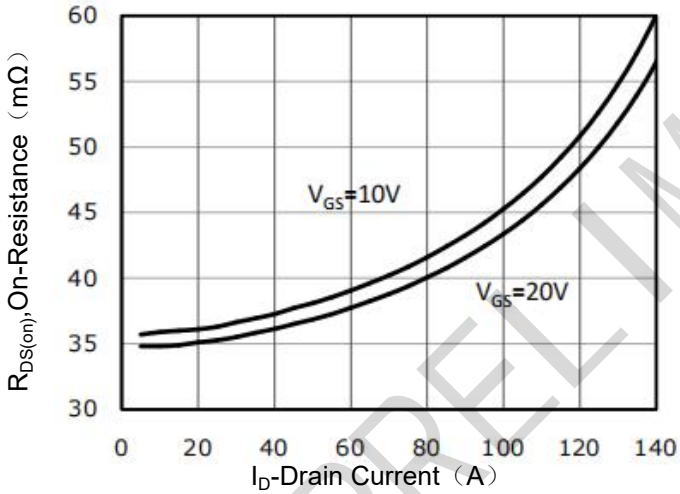


Figure 4. Gate Charge

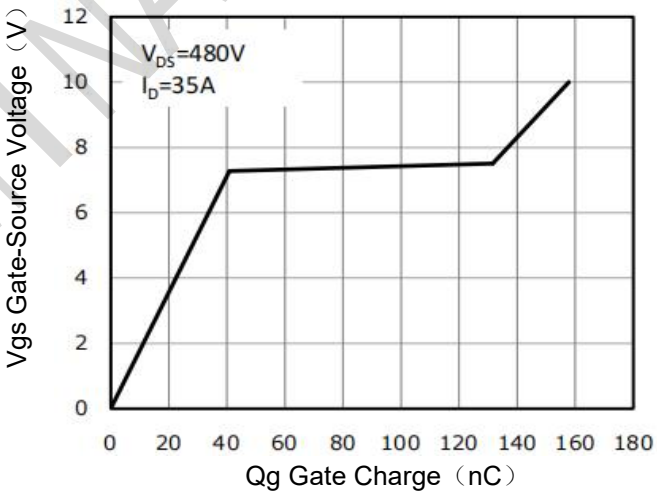


Figure 5. Capacitance

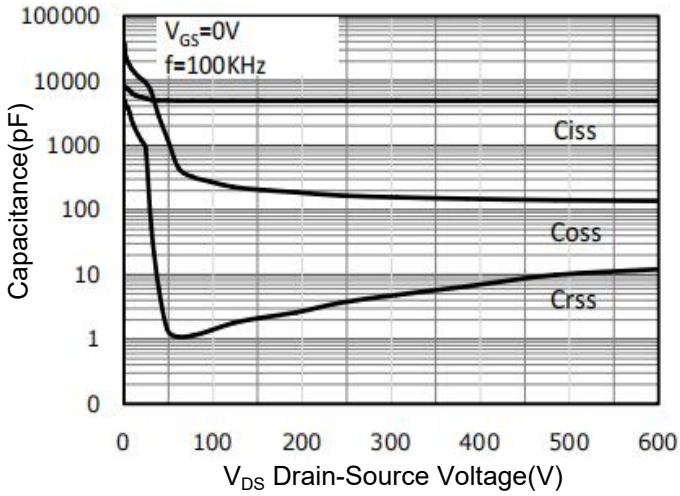
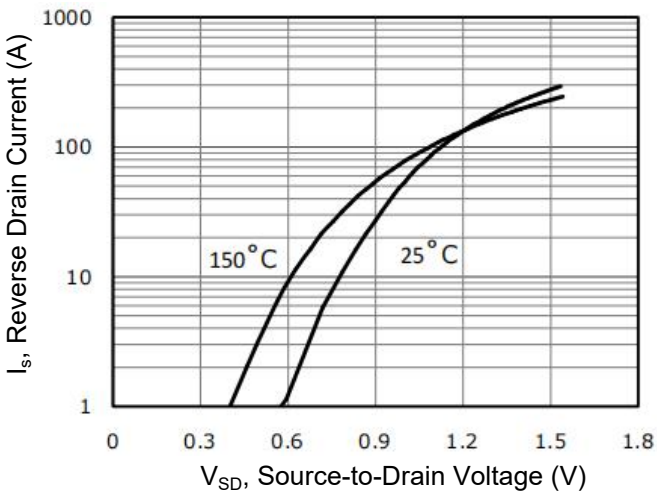


Figure 6. Source-Drain Diode Forward



PRELIMINARY

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

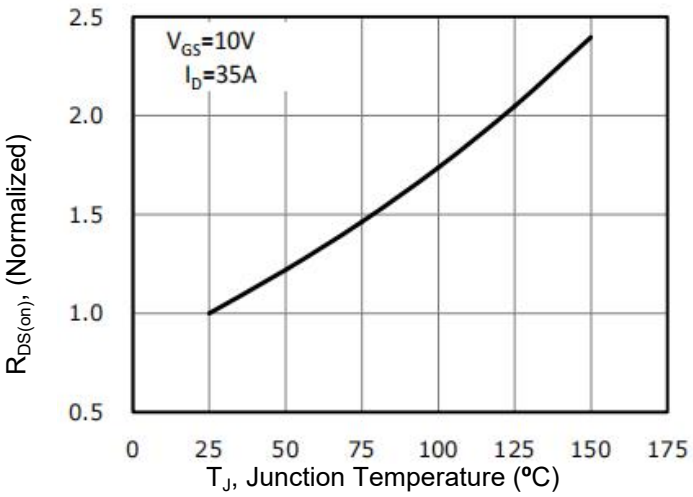


Figure 8. Safe Operation Area

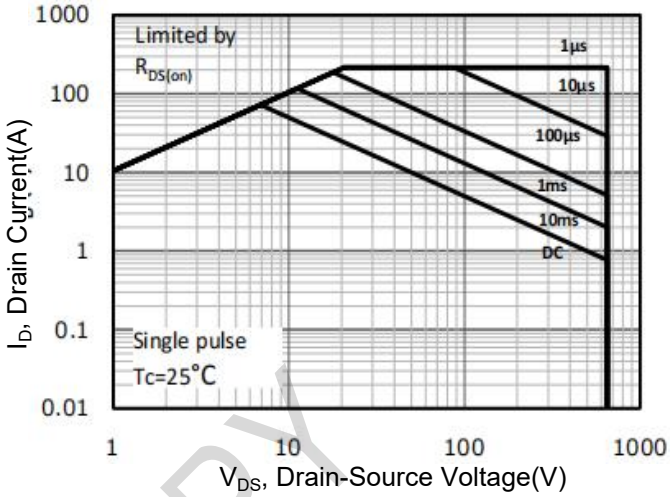


Figure 9. Maximum Continuous Drain Current vs Case Temperature

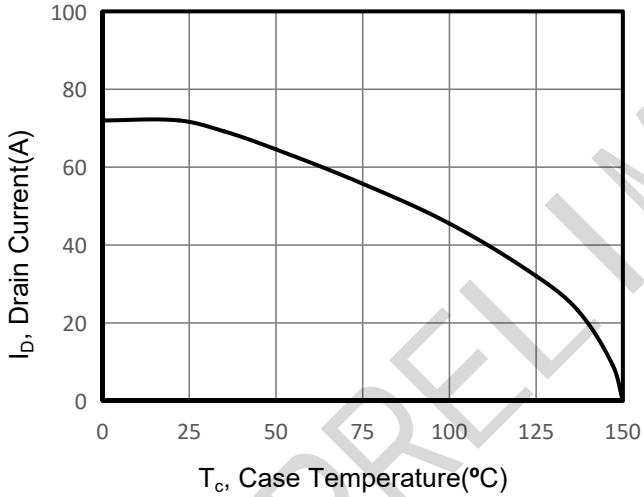
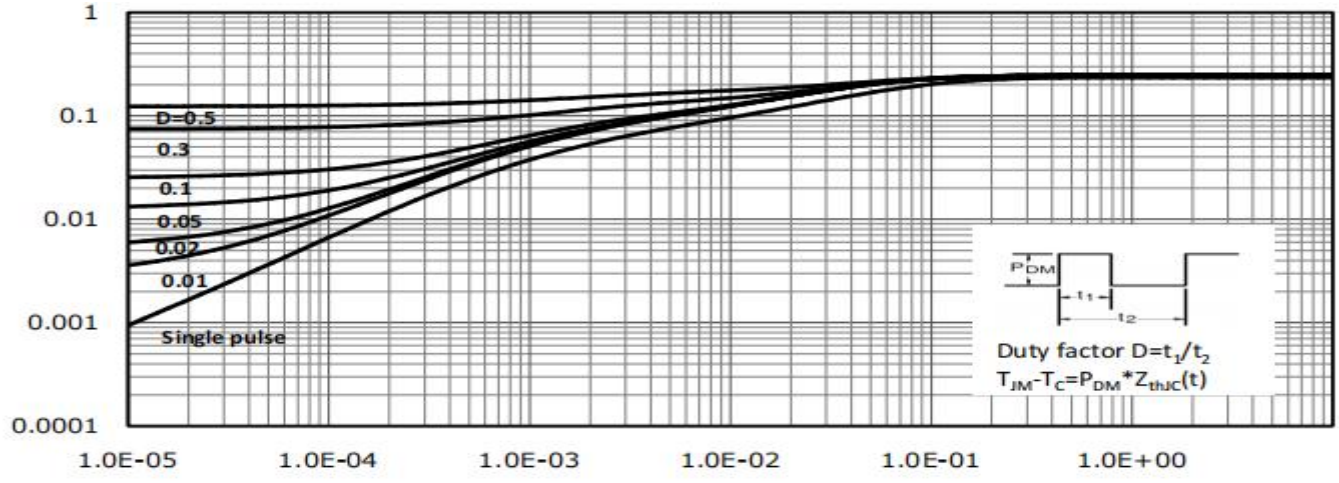


Figure 10. Normalized Maximum Transient Thermal Impedance



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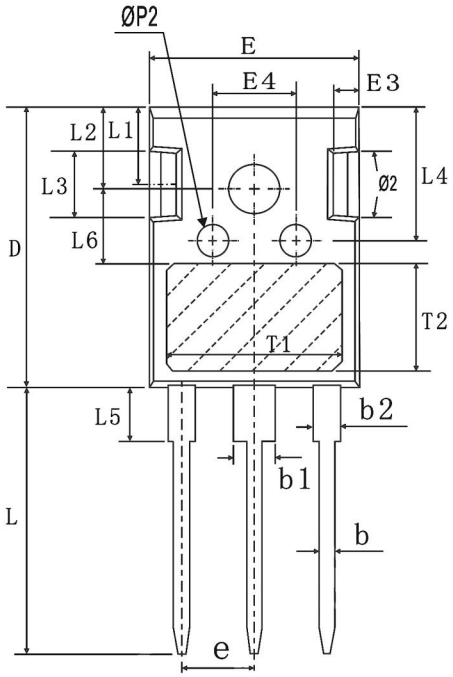
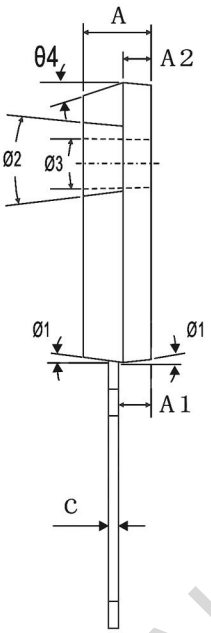
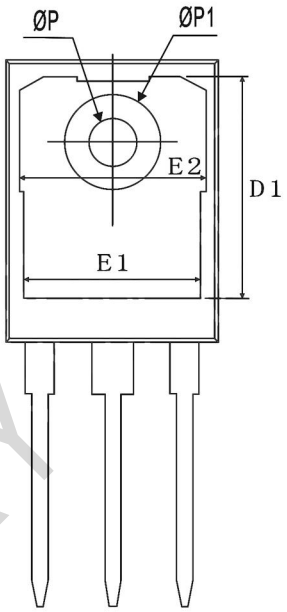
TO-247 Package Information



TOP VIEW



SIDE VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.20	2.40	2.60
A2	1.85	2.00	2.15
b	1.10	1.20	1.30
b1	2.80	3.00	3.20
b2	1.80	2.00	2.20
C	0.52	0.62	0.72
D	20.35	20.65	20.95
D1	16.35	16.55	16.75
E	15.50	15.80	16.10
E1	13.10	13.30	13.50
E2	13.80	14.00	14.20
E3	1.45	1.60	1.75
E4	6.00	6.20	6.40
L	19.80	20.00	20.20
L1	5.88	5.98	6.08
L2	5.88	5.98	6.08
L3	4.90	5.00	5.10
L4	9.70	9.80	9.90
L5	4.10	4.30	4.50
Ø1	4°	7°	10°
Ø2	11°	14°	17°
Ø3	1°	--	2°
Ø4	10°	15°	20°
ØP	3.35	3.60	3.85
ØP1	--	--	7.30
ØP2	2.25	2.50	2.75
e	5.44BSC		
T1	12.80REF		
T2	7.80REF		
L6	5.50REF		

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