

N-Channel Enhancement Mode Power MOSFET

Description

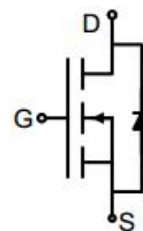
The GC20N65M uses advanced super junction technology and design to provide excellent $R_{DS(on)}$, low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

- V_{DS} 650V
- I_D (at $V_{GS} = 10V$) 20A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 180m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-263

Ordering Information

Device	Package	Marking	Packaging
GC20N65M	TO-263	GC20N65	800pcs/Tube

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Continuous Drain Current	I_D	20	A
Pulsed Drain Current (note1)	I_{DM}	60	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	151	W
Single pulse avalanche energy (note2)	E_{AS}	245	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	0.83	$^\circ\text{C/W}$

Specifications $T_J = 25^\circ\text{C}$, 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} =650 V, V _{GS} = 0V	--	--	1	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	3.0	4.0	5.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 10A	--	148	180	mΩ
Forward Transconductance	g _{FS}	V _{GS} = 5V, I _D = 10A	--	17	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 400V, f = 1.0MHz	--	1680	--	pF
Output Capacitance	C _{oss}		--	38	--	
Reverse Transfer Capacitance	C _{rss}		--	0.6	--	
Total Gate Charge	Q _g	V _{DD} = 400V, I _D = 10A, V _{GS} = 10V	--	28	--	nC
Gate-Source Charge	Q _{gs}		--	11	--	
Gate-Drain Charge	Q _{gd}		--	7	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 400V, I _D = 10A, R _G = 4Ω	--	9	--	ns
Turn-on Rise Time	t _r		--	5	--	
Turn-off Delay Time	t _{d(off)}		--	47	--	
Turn-off Fall Time	t _f		--	3.5	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	20	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 10A, V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = 10A, V _{GS} = 0V di/dt=100A/us	--	1.1	--	μC
Reverse Recovery Time	T _{rr}		--	123	--	ns

Notes

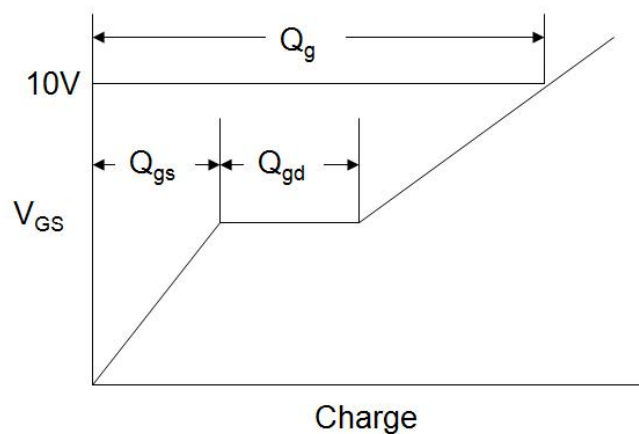
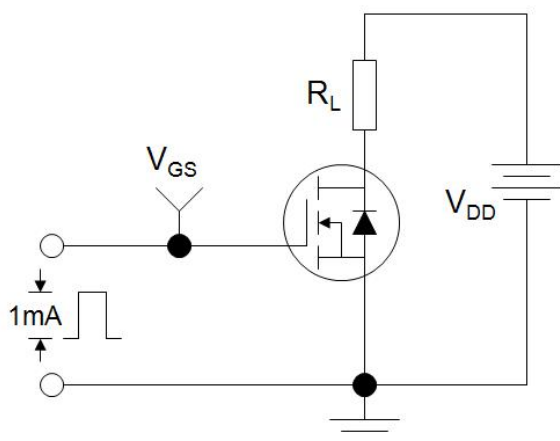
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^\circ\text{C}$, $V_{DD} = 50V$, $V_{GS} = 10V$, $L = 10mH$, $R_G = 25\Omega$

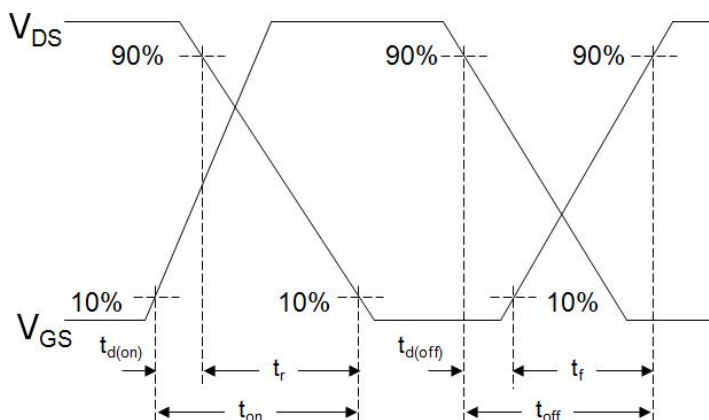
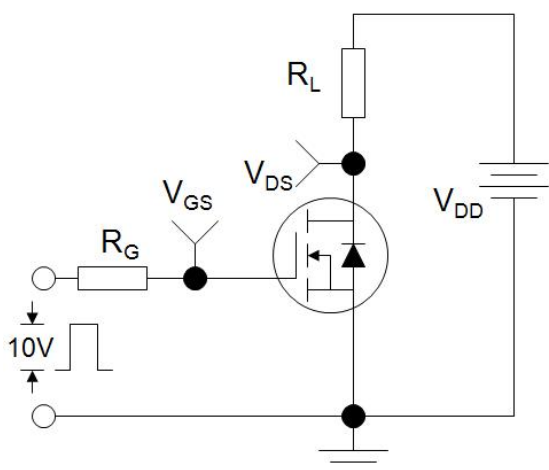
The table shows the minimum avalanche energy, which is 673mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

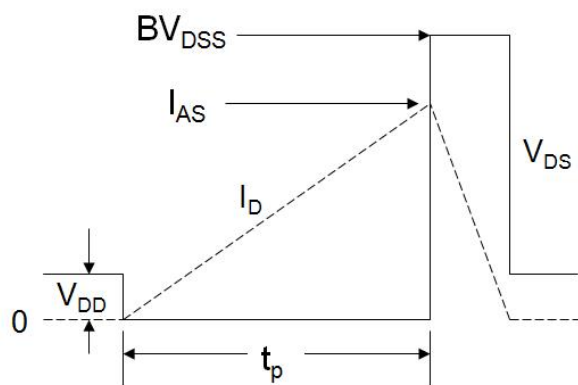
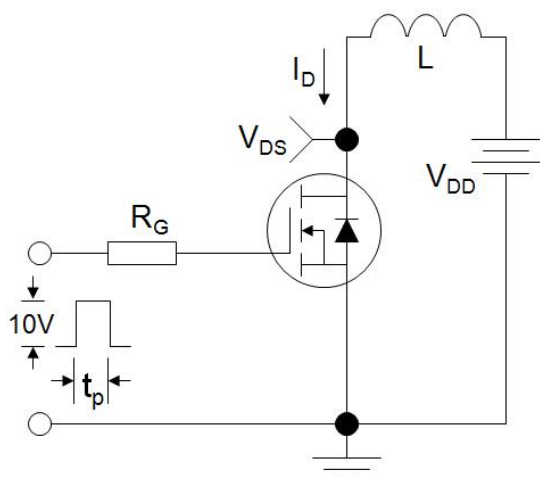
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

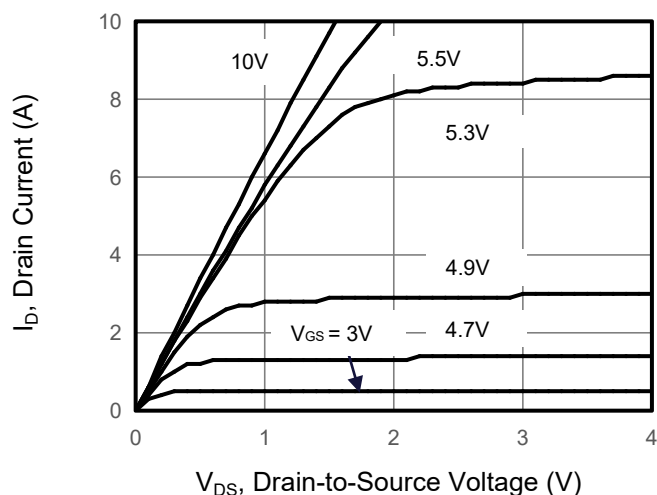


Figure 2. Transfer Characteristics

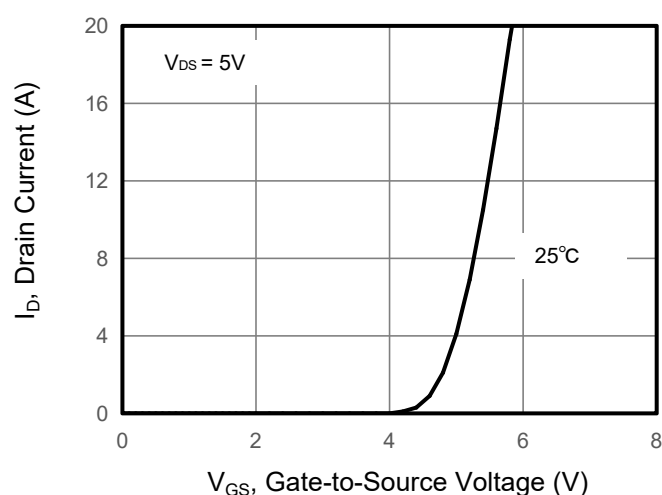


Figure 3. Drain Source On Resistance

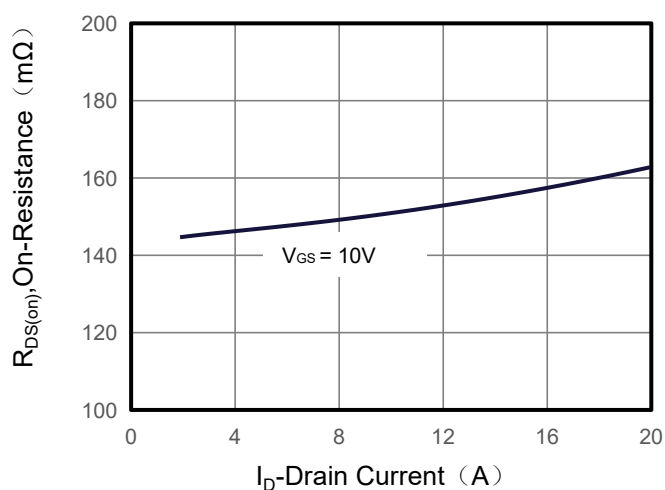


Figure 4. Gate Charge

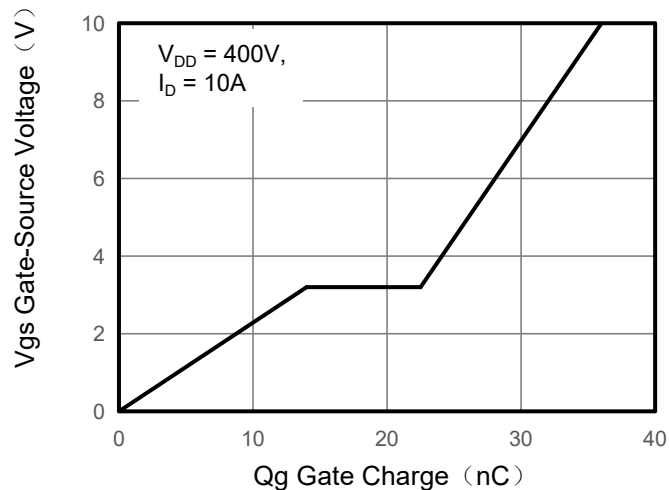


Figure 5. Capacitance

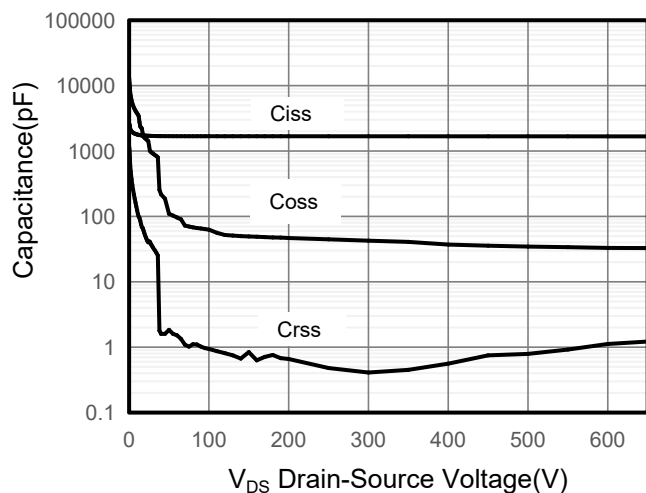
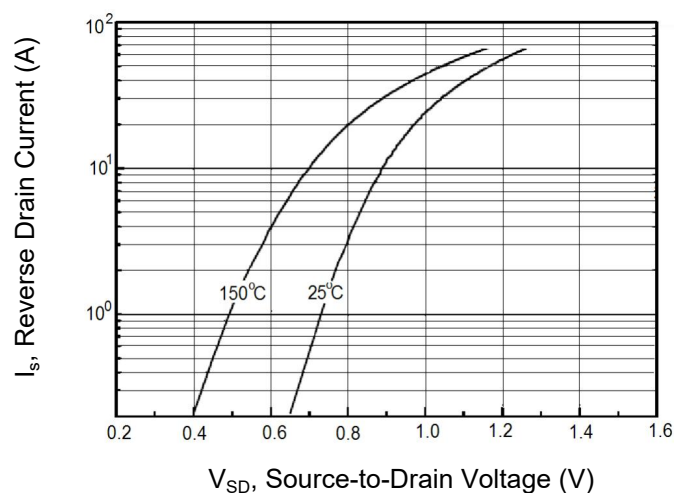


Figure 6. Source-Drain Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

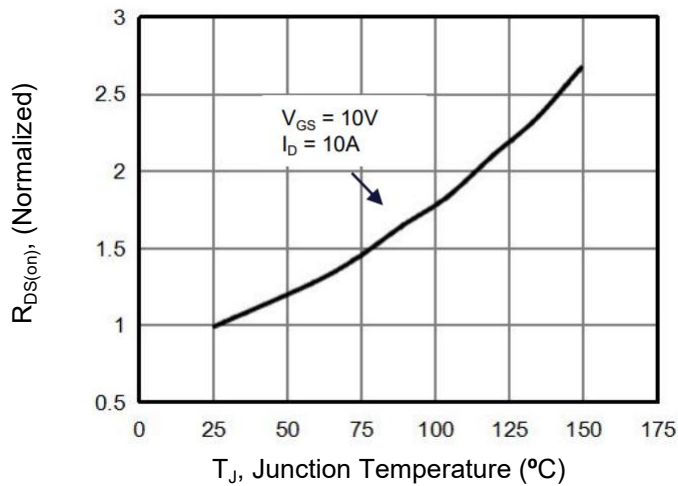


Figure 8. Safe Operation Area

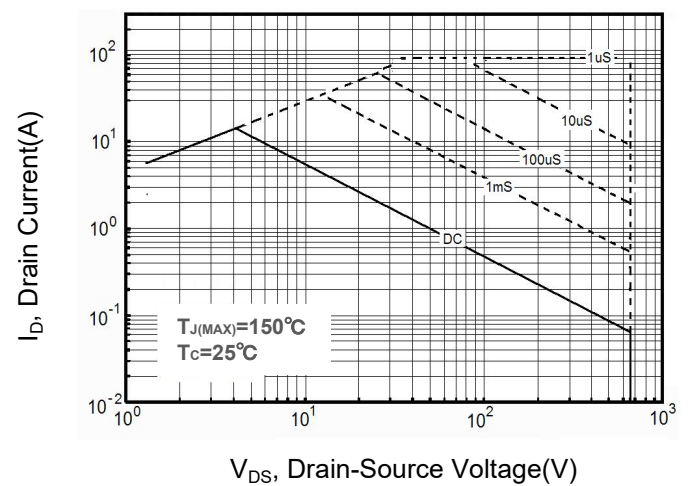
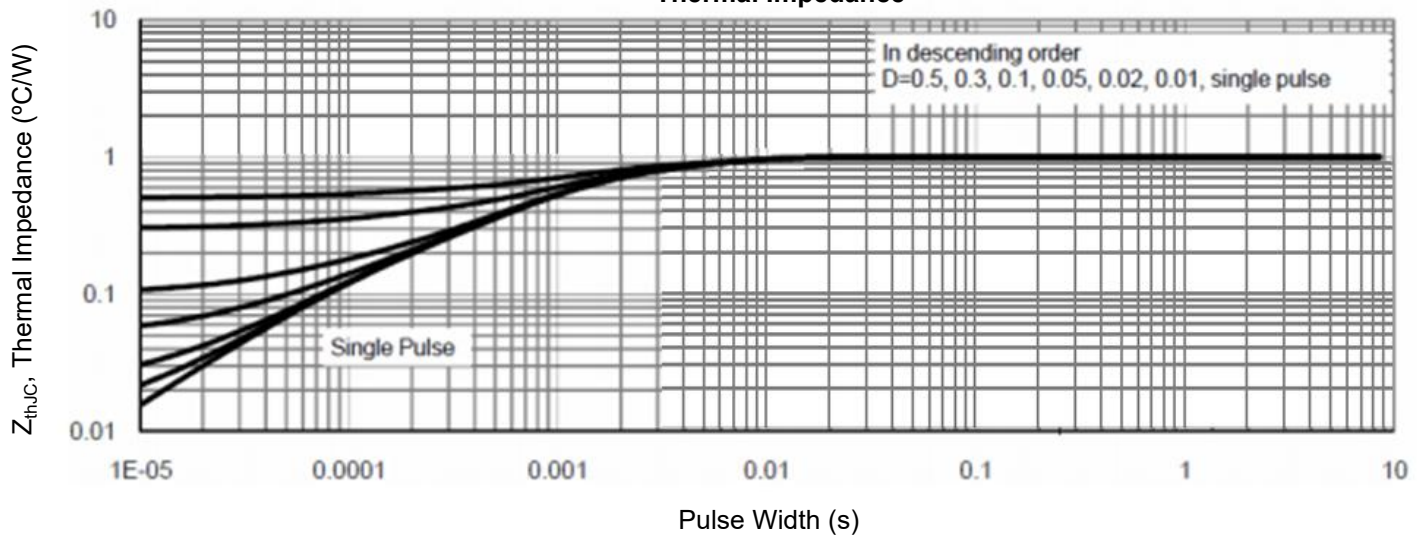
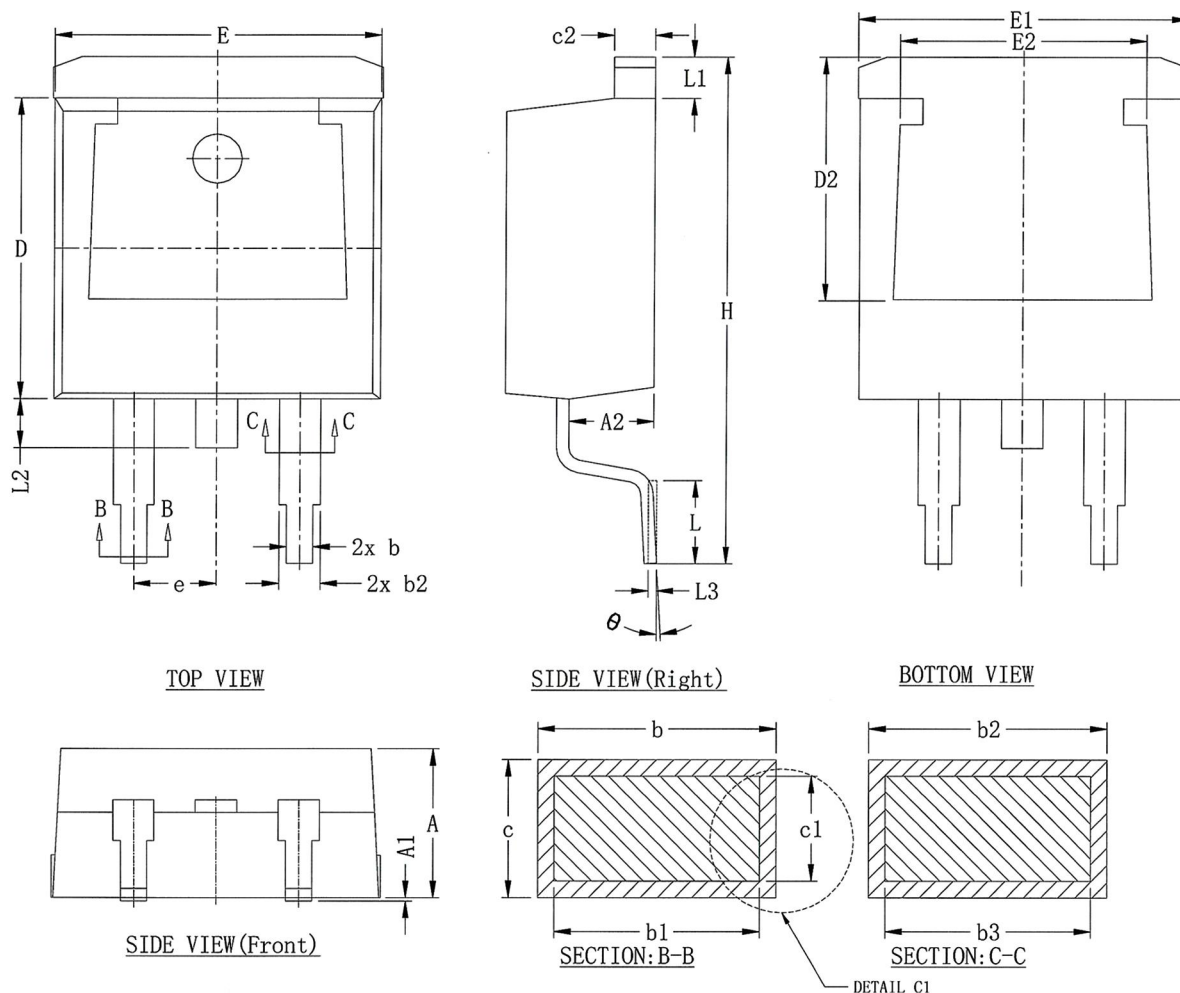


Figure 9. Normalized Maximum Transient Thermal Impedance



TO-263 Package information



DIM SYMBOL	MIN.	NOM.	MAX.	DIM SYMBOL	MIN.	NOM.	MAX.
A	4.450	4.550	4.650	D2	7.215	7.415	7.615
A1	0.000	—	0.150	E	9.900	10.000	10.100
A2	2.500	2.600	2.700	E1	9.900	10.100	10.300
b	0.753	0.853	0.953	E2	7.341	7.541	7.741
b1	0.713	0.813	0.913	e	2.540 BSC.		
b2	1.210	1.310	1.410	H	15.300	15.500	15.700
b3	1.170	1.270	1.370	L	2.340	2.540	2.740
c	0.330	0.421	0.521	L1	1.066	1.266	1.466
c1	0.281	0.381	0.481	L2	1.400	1.500	1.600
c2	1.210	1.310	1.410	L3	0.254 BSC.		
D	9.100	9.200	9.300	θ	0°	---	5°