IMBG120R090M1HXTMA1

SiC Power MOSFET N-Channel Enhancement Mode

Features

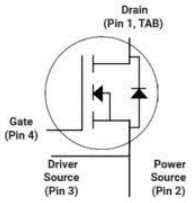
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low capacitances
- Avalanche Ruggednes

TO-263-7L
Package

Applications

- Solar Inverters
- Switch Mode Power Supplies
- Auxiliary power supplies
- Smart meters

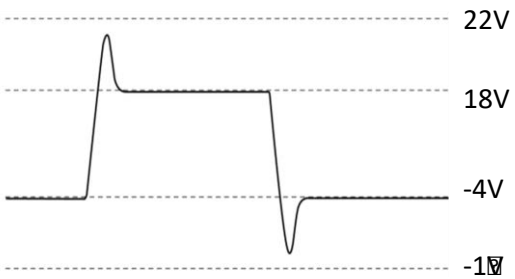
Ordering Part Number	Package	Marking
IMBG120R090M1HXTMA1	TO-263-7L	I1200EU



Maximum Ratings (T_C = 25 °C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current T_C = 25°C T_C = 100°C	I_D	 30 21	A
Source current(Body Diode) T_C = 25°C T_C = 100°C	I_S	 30 21	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	80	A
Avalanche energy, single pulse (L=10mH)	E_{AS}	600	mJ
Gate-Source voltage	V_{GS}	-4/+18	V
Gate-Source voltage（dynamic,Absolute maximum values）	V_{GSmax}	-8/+22	V
Power dissipation (T_C = 25°C)	P_{tot}	136	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°C

- Example of acceptable V_{GS} waveform



Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	1.1	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristics (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristics						
Drain-source breakdown voltage	V_{DSS}	1200	-	-	V	V_{GS}=0V, I_D=100uA
Gate threshold voltage	$V_{GS(th)}$	2.3	2.8	3.6	V	V_{DS}=V_{GS},I_D=5mA
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	V_{DS}=1200V,V_{GS}=0V
		-	1	10		T_C=25°C
		-	5	-		T_C=175°C
Gate-source leakage current	I_{GSS}	-		100	nA	V_{GS}=18V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	75	85	mΩ	V_{GS}=18V, I_D=20A,
		-	75	85		T_J=25°C
		-	125	-		T_J=175°C
Transconductance	g_{fs}	-	10	-	S	V_{DS}=20V,I_D=20A
Dynamic Characteristics						
Input Capacitance	C_{iss}	-	920	-	pF	V_{DS} = 1000V V_{GS} = 0V T_J = 25°C V_{AC} = 25mV f = 1MHz
Output Capacitance	C_{oss}	-	57	-		
Reverse Transfer Capacitance	C_{rss}	-	3.9	-		
Gate Total Charge	Q_G	-	40	-	nC	V_{DS} = 800V V_{GS} = -4/18V I_D = 20A
Gate-Source charge	Q_{gs}	-	7	-		
Gate-Drain charge	Q_{gd}	-	19	-		
Turn-On Switching Energy	E_{ON}	-	320	-	μJ	V_{DD} = 800V V_{GS} = -4/+15V I_D = 20A R_G = 0Ω L = 120uH
Turn-Off Switching Energy	E_{OFF}	-	49	-		
Turn-on delay time	$t_{d(on)}$	-	19	-	ns	
Rise time	t_r	-	21	-		
Turn-off delay time	$t_{d(off)}$	-	15	-		
Fall time	t_f	-	17	-		
Gate resistance	R_G	-	1.5	-	Ω	V_{AC} = 25mV, f=1MHz

Body Diode Characteristics

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	4.2	-	V	V_{GS}=-4V,I_{SD}=10A, T_J=25°C
		-	3.8	-		V_{GS}=-4V,I_{SD}=10A, T_J=175°C
Body Diode Forward Current	I_{SD}	-	-	30	A	V_{GS}=-4V,T_J=25°C
Pulsed Body Diode Forward Current	I_{SDM}	-	-	89		
Reverse Recovery Time	t_{rr}	-	39.6	-	ns	V_R = 800V, V_{GS} = -4V I_D = 20A di/dt = 700A/μS T_J = 25°C
Reverse Recovery Charge	Q_{rr}	-	141.1	-	nC	
Reverse Recovery Energy	E_{REC}	-	62.9	-	uJ	
Peak Reverse Recovery Current	I_{rrm}	-	6.2	-	A	
Charge Time	t_A	-	9.9	-	ns	
DisCharge Time	t_B	-	29.7	-	ns	
Reverse Recovery Time	t_{rr}	-	45.4	-	ns	V_R = 800V, V_{GS} = -4V I_D = 20A di/dt = 700A/μS T_J = 175°C
Reverse Recovery Charge	Q_{rr}	-	397	-	nC	
Reverse Recovery Energy	E_{REC}	-	180.1	-	uJ	
Peak Reverse Recovery Current	I_{rrm}	-	13.8	-	A	
Charge Time	t_A	-	30.8	-	ns	
DisCharge Time	t_B	-	14.9	-	ns	

Typical Performance Characteristics

Fig 1. Output Characteristic (T_J=-40℃)

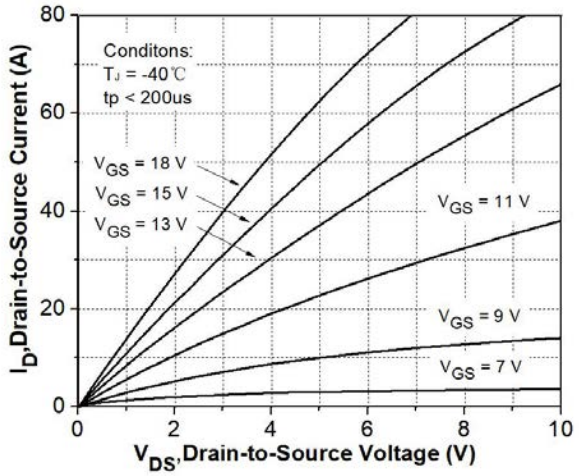


Fig 2. Output Characteristic (T_J=25℃)

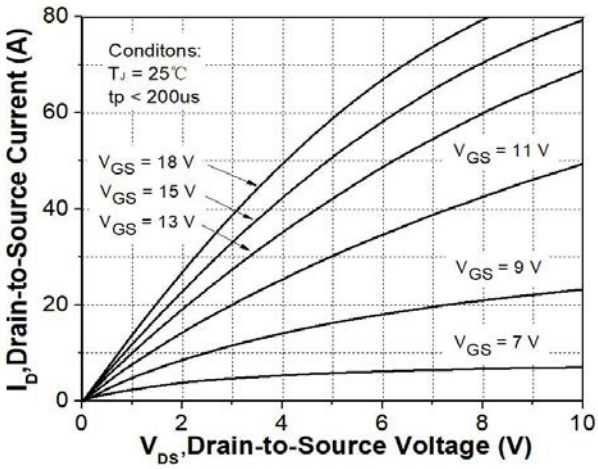


Fig 3. Output Characteristic (T_J=175℃)

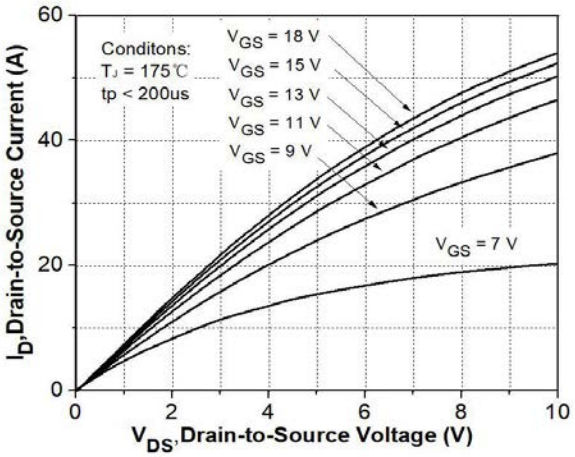


Fig 4: Rdson Vs Ids Characteristic

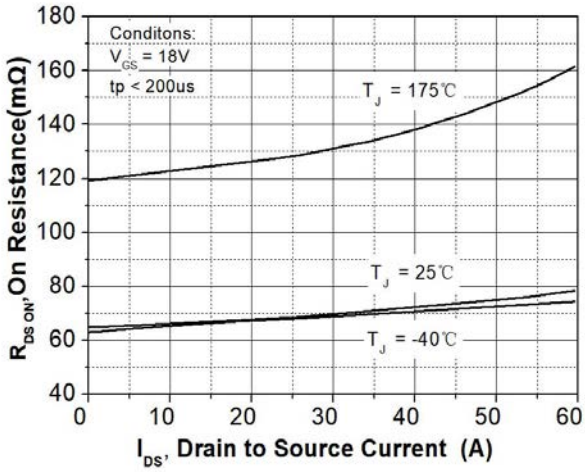


Fig 5: Rds(on) vs. Temperature

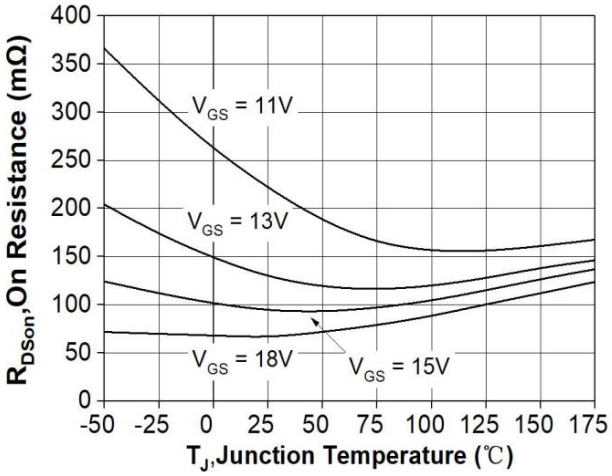


Fig 6: Transfer Characteristic

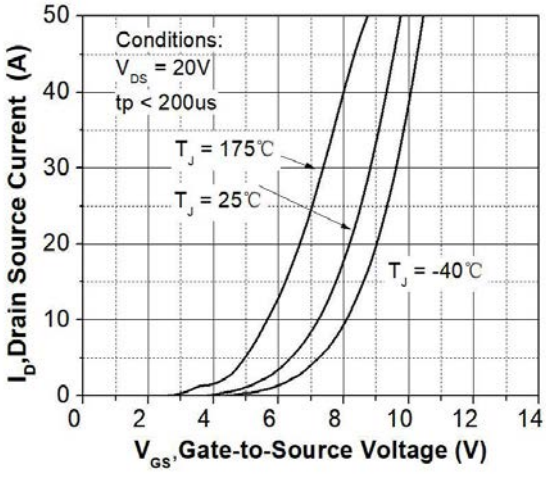


Fig 7: Body-diode Characteristic (T_J=-40℃)

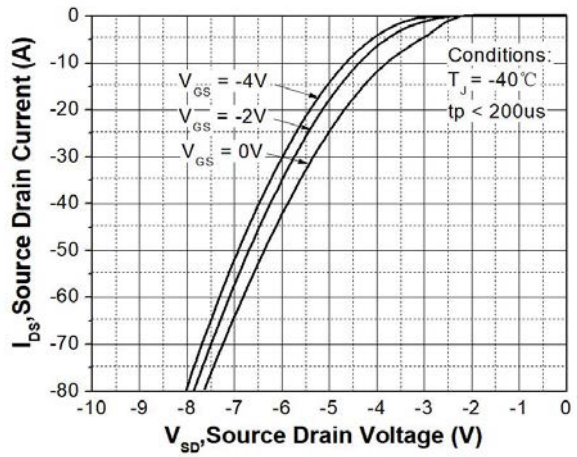


Fig 8: Body-diode Characteristic (T_J=25℃)

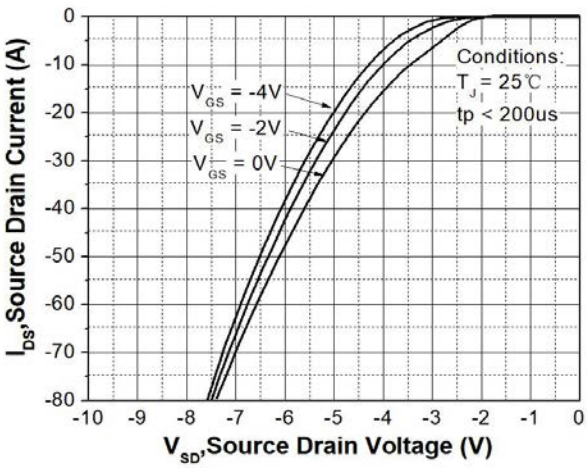


Fig 9: Body-diode Characteristic (T_J=175℃)

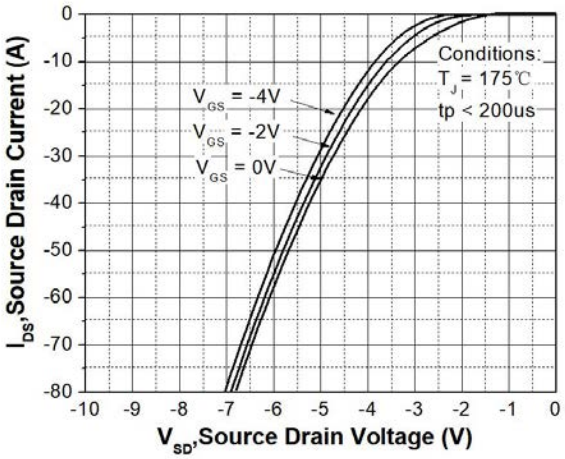


Fig 10: V_{TH} Vs T_J Temperature Characteristic

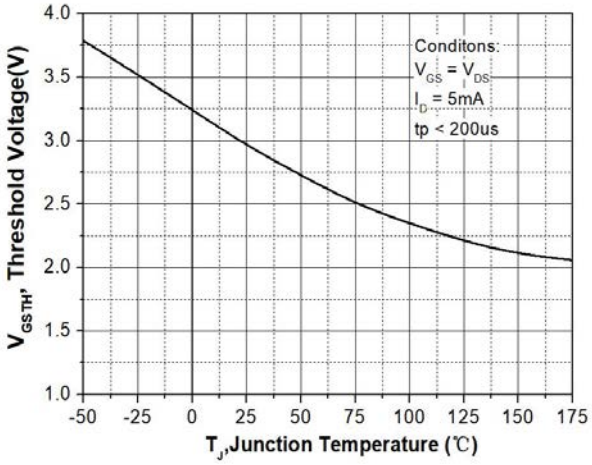


Fig 11: Gate Charge Characteristics

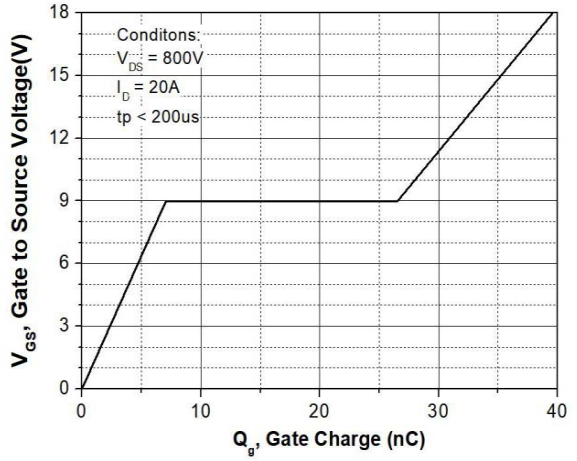


Fig 12: 3rd Quadrant Characteristic(T_J=-40℃)

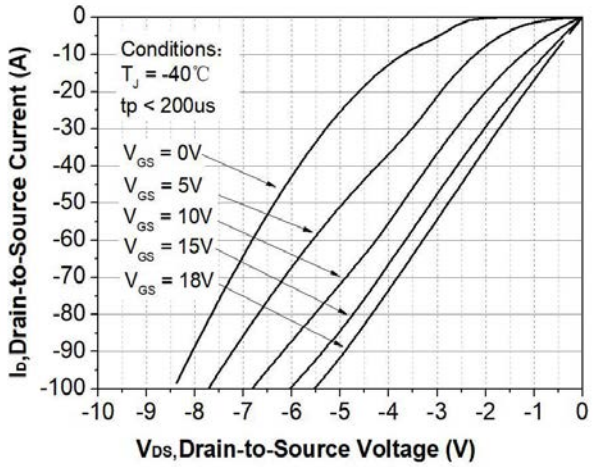


Fig 13: 3rd Quadrant Characteristic(T_J=25℃)

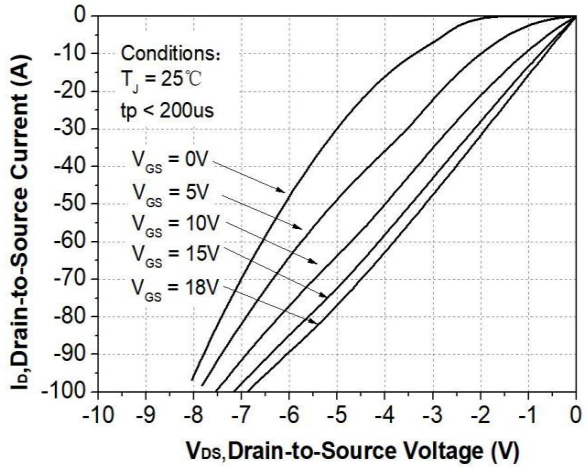


Fig 14: 3rd Quadrant Characteristic(T_J=175℃)

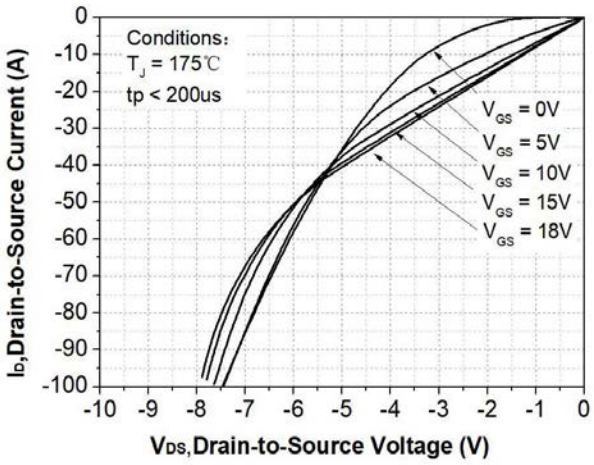


Fig 15: Capacitance Characteristic

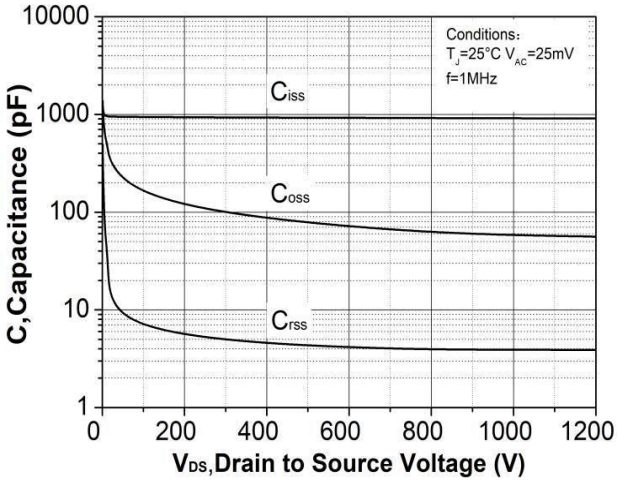


Fig 16: Safe Operating Area

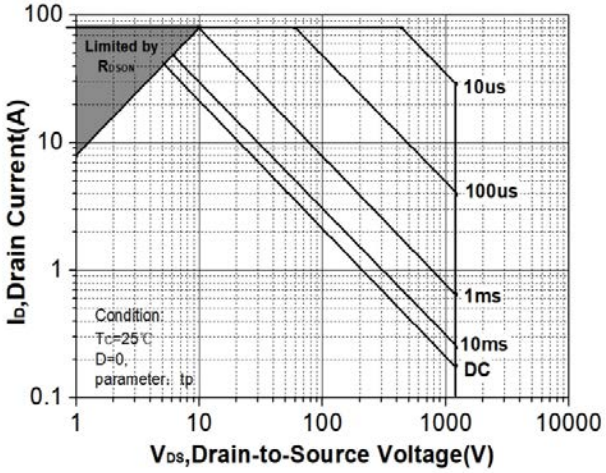
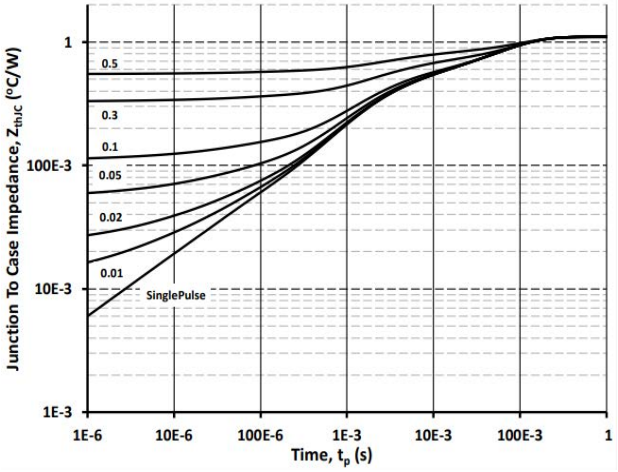


Fig 17: Transient Thermal Impedance



Test Circuit Schematic

Figure A. Definition of switching times

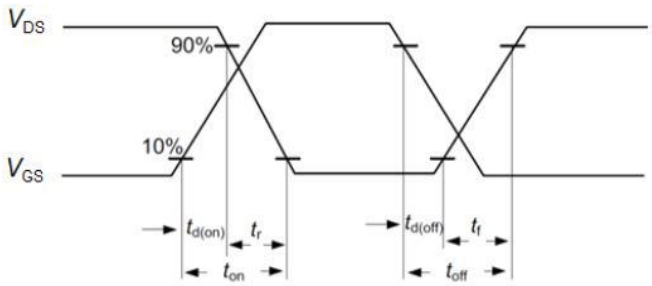


Figure B. Dynamic test circuit

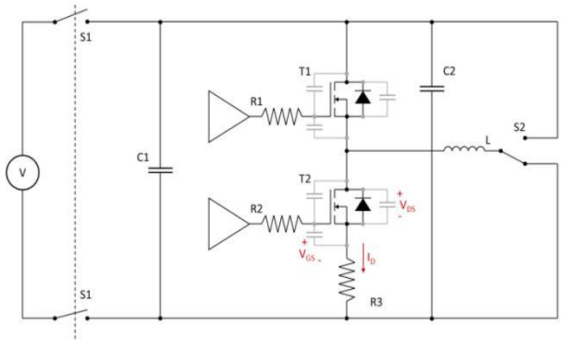


Figure C. Definition of body diodeswitching characteristics

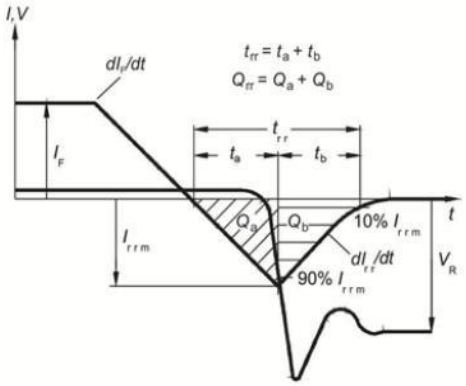
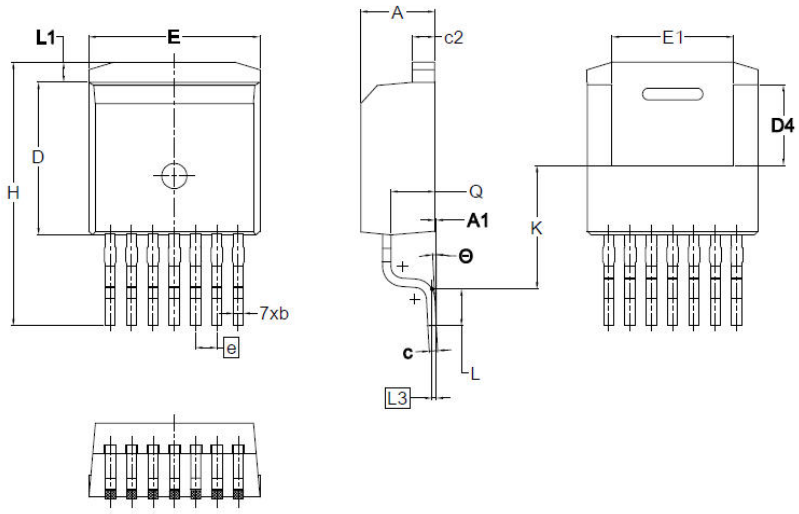


Figure C. **Definition of diode switching characteristics**

Package Dimensions

Package TO-263-7L



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.30	4.40	4.50
A1	0.00	0.10	0.25
b	0.50	0.60	0.70
c	0.45	0.50	0.60
c2	1.20	1.30	1.40
D	8.93	9.08	9.23
D4	4.65	4.80	4.95
E	10.08	10.18	10.28
E1	6.82	7.22	7.62
e	1.27 BSC		
H	15.00	15.70	16.00
K	7.30		
L	1.90	2.20	2.50
L1	1.00	1.20	1.40
L3	0.25 BSC		
Q	2.45	2.60	2.75
Θ	0°	3°	7°

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