N-Channel 1200V (D-S) SiC MOSFET

Features

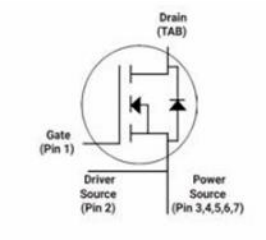
- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant



TO-263-7L

Applications

- Switch mode power supplies
- Renewable energy
- On Board Charger
- High voltage DC/DC converters



Absolute Maximum Ratings (T_J=25°C unless otherwise noted)				
Parameter		**Symbol**	**Ratings**	**Unit**
Drain Source Voltage		V_{DS}	1200	V
Gate Source Voltage		V_{GS}	-8/+22	V
Recommend Gate Source Voltage		V_{GSop}	-4/+18	V
Drain Current Continuous V_{GS}=18V	T_C=25°C	I_D	97	A
	T_C=125°C		56	
Power Dissipation	T_C=25°C	P_D	556	W
Operating Temperature and Storage Temperature Range		T_J/T_{STG}	-55 to +175	°C

Thermal Characteristics			
Parameter	**Symbol**	**Max.**	**Unit**
Thermal Resistance Junction to Case	R_{thJC}	0.27	°C/W
Thermal Resistance Junction to Ambient	R_{thJA}	40	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA	1200	--	--	V
Gate Leakage Current	I_{GSS}	V_{GS}=18V, V_{DS}=0V	--	--	100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V	--	1	5	μA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_{DS}=15mA	2	2.8	4	V
		V_{DS}=V_{GS}, I_{DS}=15mA,T_j=175°C	--	1.9	--	
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS}=18V, I_D=50A	--	20	27	mΩ
		V_{GS}=18V, I_D=50A, T_J=175°C	--	40	--	
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS}=15V, I_D=50A	--	24	35	mΩ
		V_{GS}=15V, I_D=50A, T_J=175°C	--	43	--	
Total Gate Charge	Q_g	$V_{GS(off)}$=-4V, $V_{GS(on)}$=18V V_{DD}=1000V, I_D=50A	--	175	--	nC
Gate Source Charge	Q_{gs}		--	39.2	--	
Gate Drain Charge	Q_{gd}		--	23.2	--	
Turn-On Switching Energy	E_{ON}	V_{GS}=-4/+18V, V_{DD}=1000V， I_D=50A, R_G=5Ω, L=100uH	--	0.76	--	mJ
Turn-Off Switching Energy	E_{OFF}		--	0.35	--	
Tum-on Delay Time	$t_{d(on)}$		--	20.2	--	ns
Turn-on Rise Time	t_r		--	12.8	--	
Turn-off Delay Time	$t_{d(off)}$		--	57.6	--	
Turn-off Fall Time	t_f		--	18.8	--	
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=1200V, V_{AC}=25mV, f=1MHz	--	4983	--	pF
Output Capacitance	C_{oss}		--	140	--	
Reverse Transfer Capacitance	C_{rss}		--	9.3	--	
Gate resistance	R_G	V_{AC} = 25mV, f=1MHz	--	2.3	--	Ω

Reverse Diode Characteristics (T_J=25°C unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Diode Forward Voltage	V_{SD}	I_{SD}=30A, V_{GS}=-4V	--	4.2	--	V
		I_{SD}=30A, V_{GS}=-4V, T_J=175°C	--	3.8	--	
Continuous Diode Forward Current	I_{SD}	V_{GS}=-4V	--	97	--	A
Reverse Recovery Time	t_{rr}	V_R=1000V, I_F=50A, V_{GS}=-4V, di/dt=1000A/μs	--	25.2	--	ns
Reverse Recovery Charge	Q_{rr}		--	170	--	nC
Reverse Recovery Energy	E_{REC}		--	20	--	uJ
Peak Reverse Recovery Current	I_{rrm}		--	11.9	--	A
Charge Time	t_A		--	13.6	--	ns
DisCharge Time	t_B		--	11.6	--	ns
Reverse Recovery Time	t_{rr}	V_R=1000V, I_F=50A, V_{GS}=-4V, di/dt=1000A/μs T_J=175°C	--	81.2	--	ns
Reverse Recovery Charge	Q_{rr}		--	1230	--	nC
Reverse Recovery Energy	E_{REC}		--	38	--	μJ
Peak Reverse Recovery Current	I_{rrm}		--	23.6	--	A
Charge Time	t_A		--	32	--	ns
DisCharge Time	t_B		--	49.2	--	ns

Typical Characteristics Curves (T_J = 25℃ unless otherwise noted)

Figure 1. Output Characteristic (T_J=-55℃)

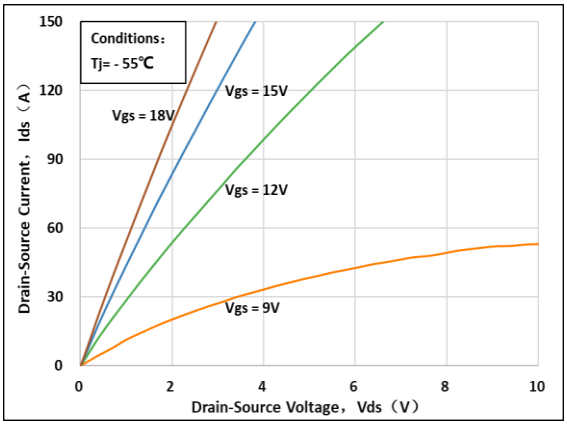


Figure 2. Output Characteristic (T_J=25℃)

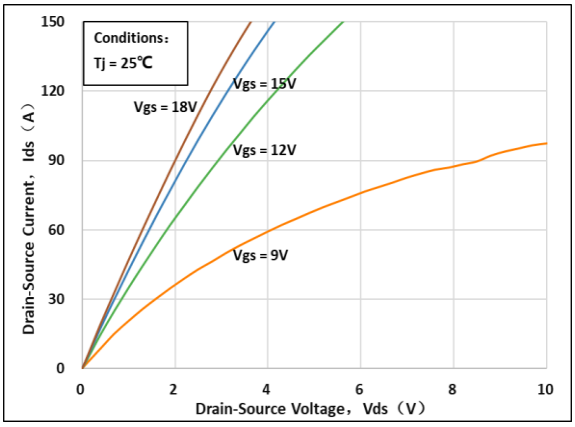


Figure 3. Output Characteristic (T_J=175℃)

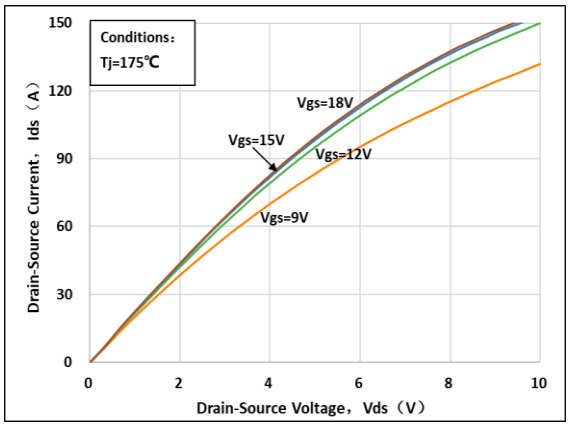


Figure 4. Rdson Vs Ids Characteristic

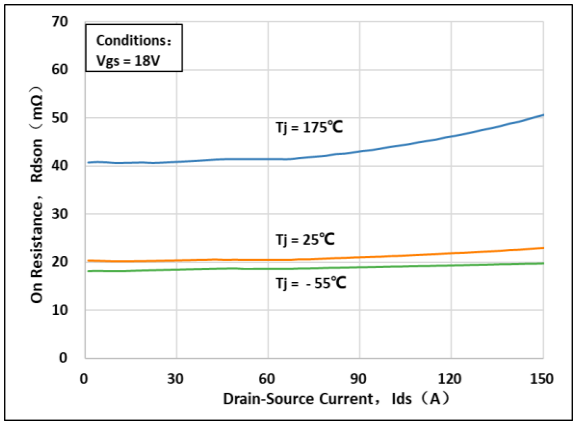


Figure 5. Rds(on) vs. Temperature

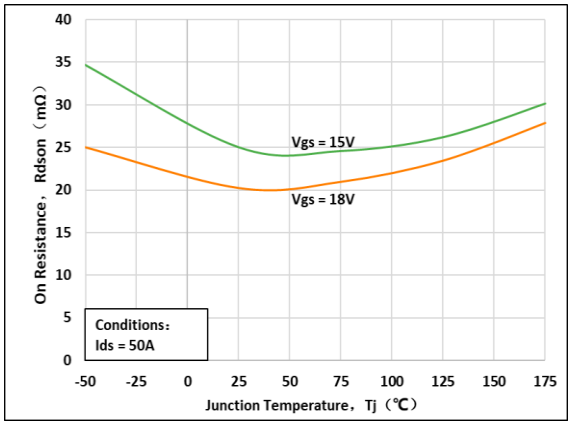
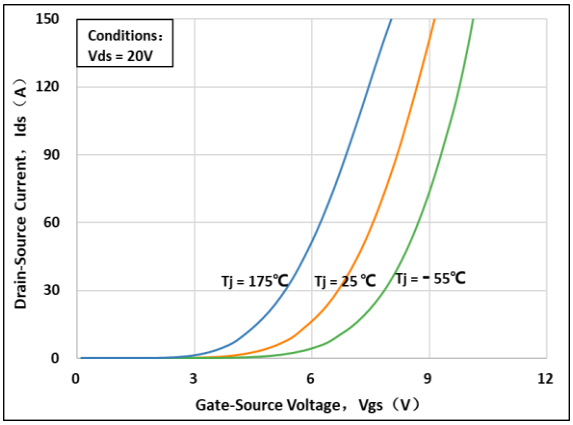


Figure 6. Transfer Characteristic



Typical Characteristics Curves (T_J = 25℃ unless otherwise noted)

Figure 7. Body-diode Characteristic (T_J=-55℃)

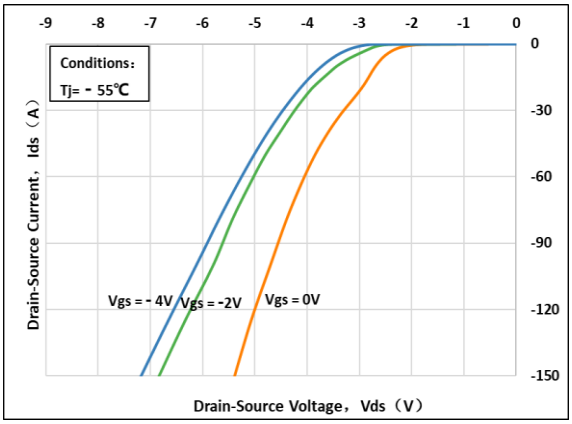


Figure 8. Body-diode Characteristic (T_J=25℃)

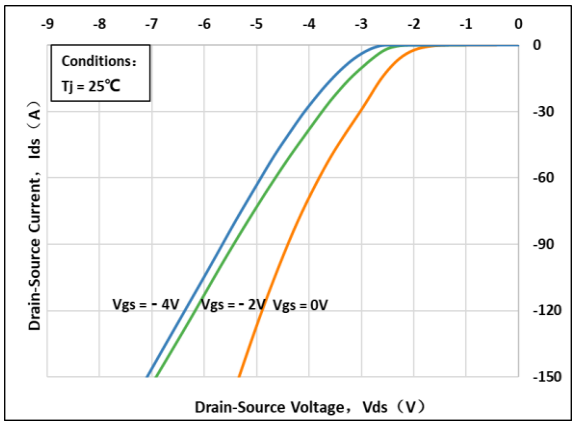


Figure 9: Body-diode Characteristic (T_J=175℃)

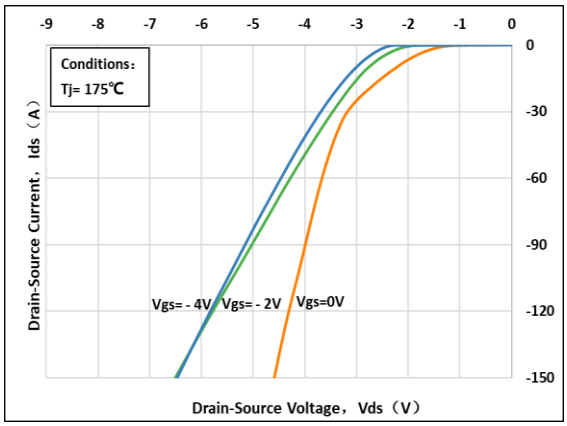


Figure 10: V_{TH} Vs T_J Temperature Characteristic

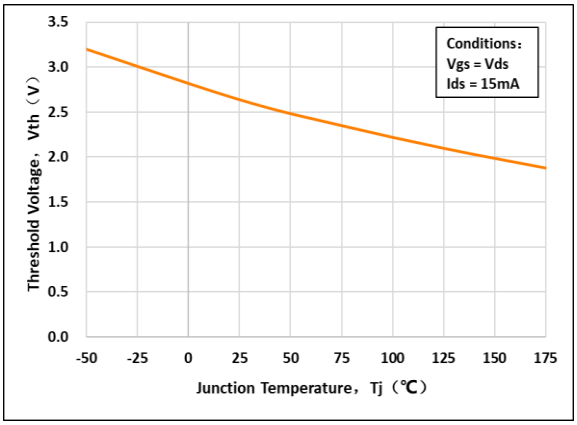


Figure 11: 3rd Quadrant Characteristic(T_J=-55℃)

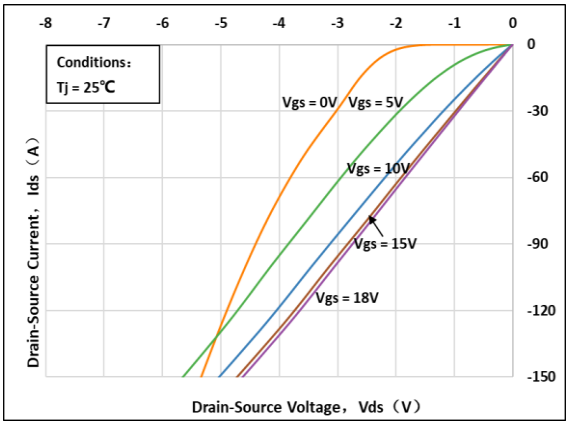
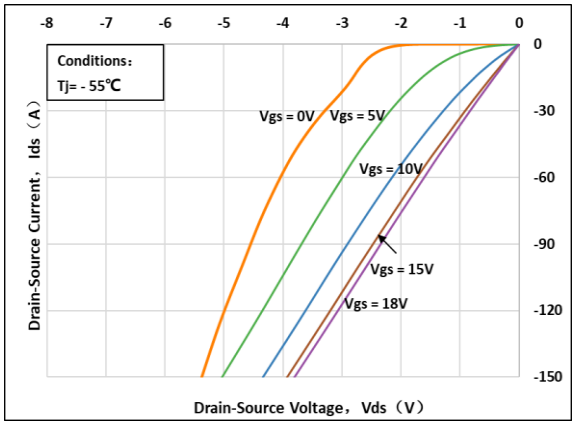


Figure 12: 3rd Quadrant Characteristic(T_J=25℃)



Typical Characteristics Curves (T_J = 25℃ unless otherwise noted)

Figure 13: 3rd Quadrant Characteristic(T_J=175℃)

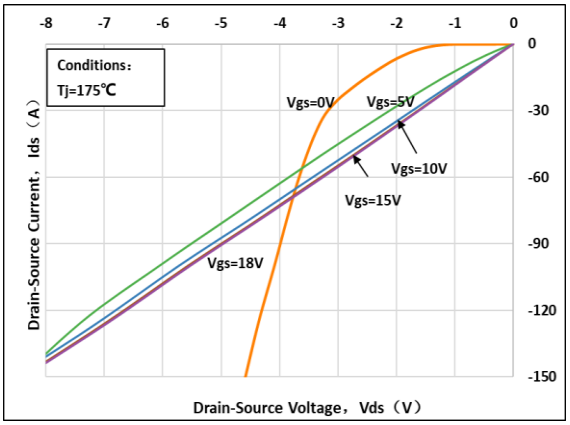


Figure 14: Gate Charge Characteristics

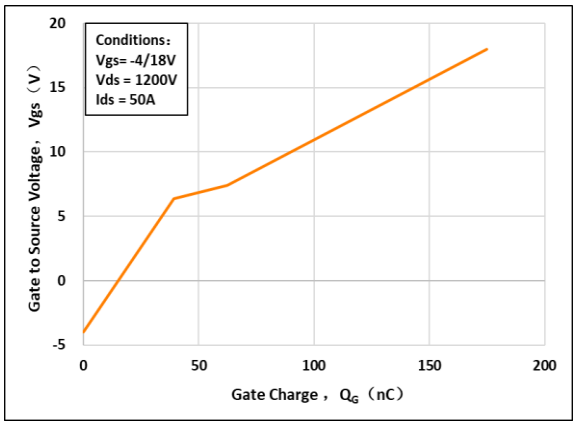


Figure 15: Drain Current vs.Case Temperature

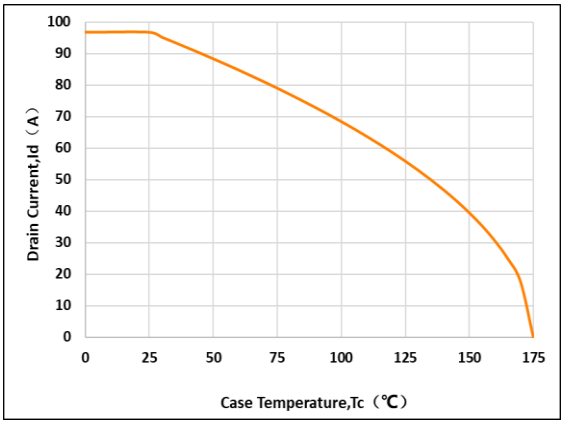


Figure 16: Safe Operating Area

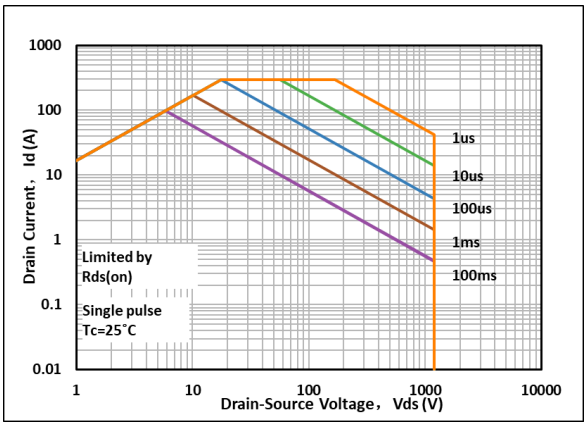


Figure 17: Capacitance Characteristics

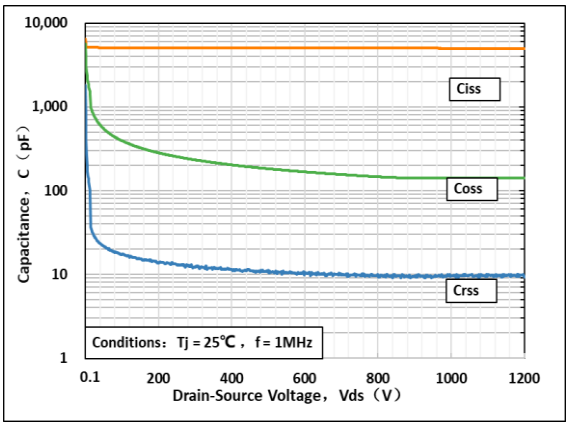
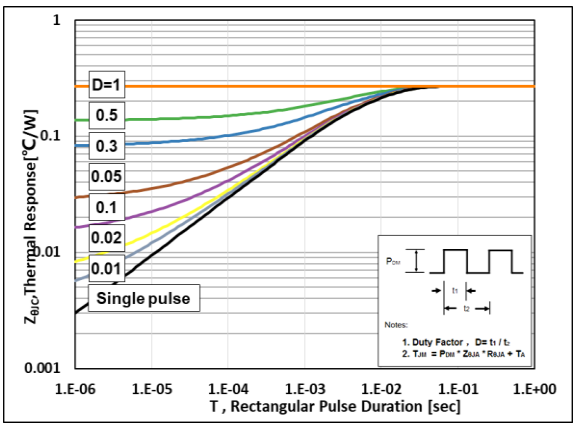
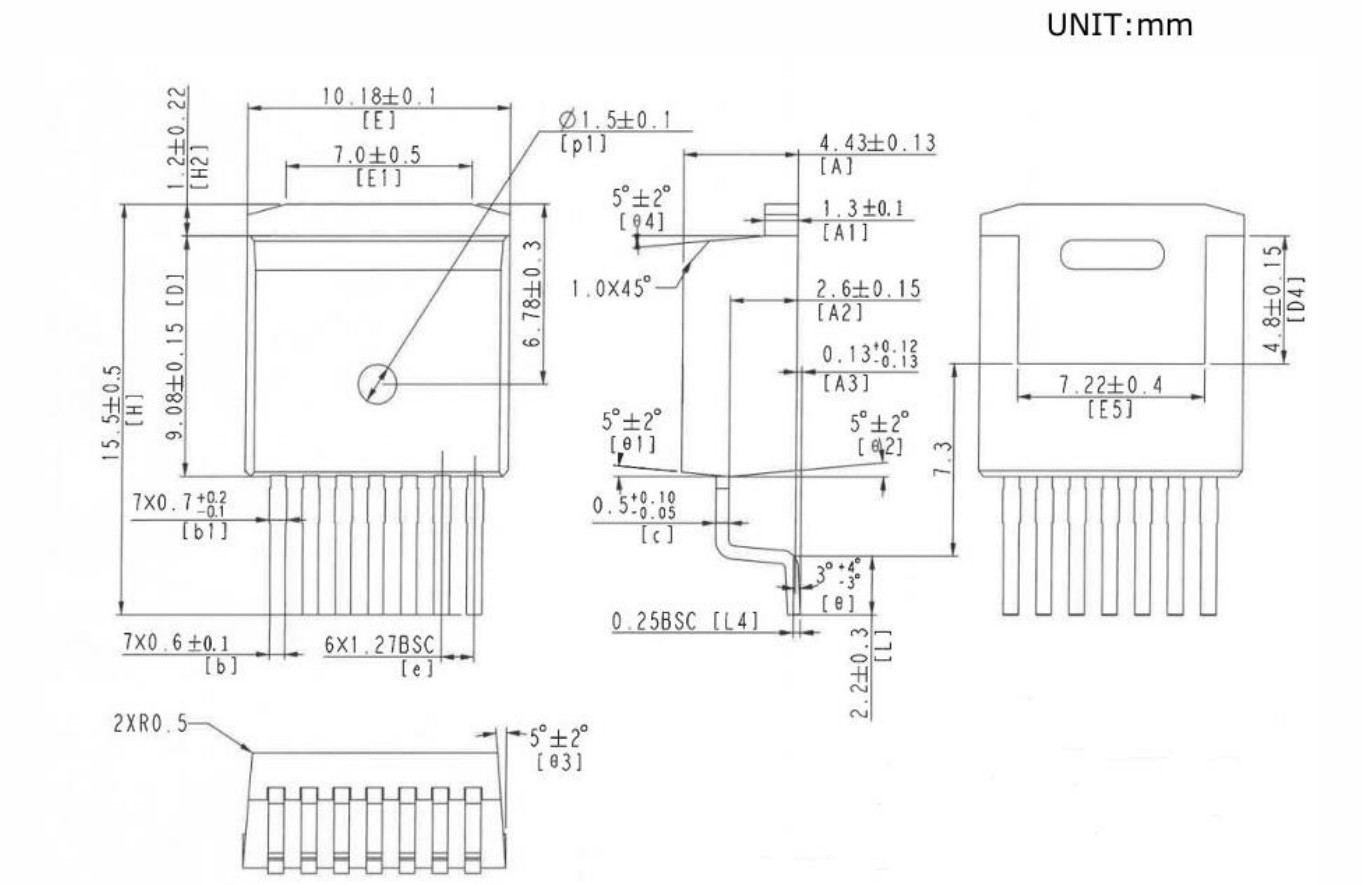


Figure 18: Transient Thermal Impedance



Package Outline Dimensions (Unit: millimeters)

TO-263-7L



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