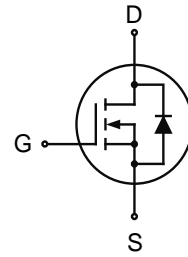


AP9N90F

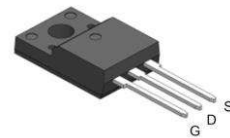
N-Channel Enhancement Mosfet

Feature

- 900V,9 A
RDS(ON) $\leq 1.3 \Omega$ @ VGS=10V, TYP=0.9 Ω
- Fast Switching
- Low ON Resistance(Rdson $\leq 1.3\Omega$)
- 100% Single Pulse avalanche energy Test
- Rohs compliant



Schematic Diagram



TO-220F

Application

- Switch Mode Power Supply (SMPS)
- Electronic Ballast
- Electronic Transformer

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
9N90F	AP9N90F	TO-220F	-	-	1000

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	900	V
Gate-Source Voltage	V _{GS}	±30	V
Continuous Drain Current (T _C =25°C)	I _D	9	A
Continuous Drain Current (T _C =100°C)	I _D	5.8	A
Pulsed Drain Current ⁽¹⁾	I _{DM}	36	A
Power Dissipation	P _D	60	W
Single Pulse Avalanche Energy ⁽³⁾	E _{AS}	1000	mJ
Junction to case	R _{θJC}	2.08	°C/W
Junction to Ambient	R _{θJA}	62.5	°C/W
Junction Temperature	T _J	150	°C
Storage Temperature	T _{STG}	-55~ +150	°C

MOSFET ELECTRICAL CHARACTERISTICS($T_J=25^{\circ}\text{C}$ unless otherwise noted)

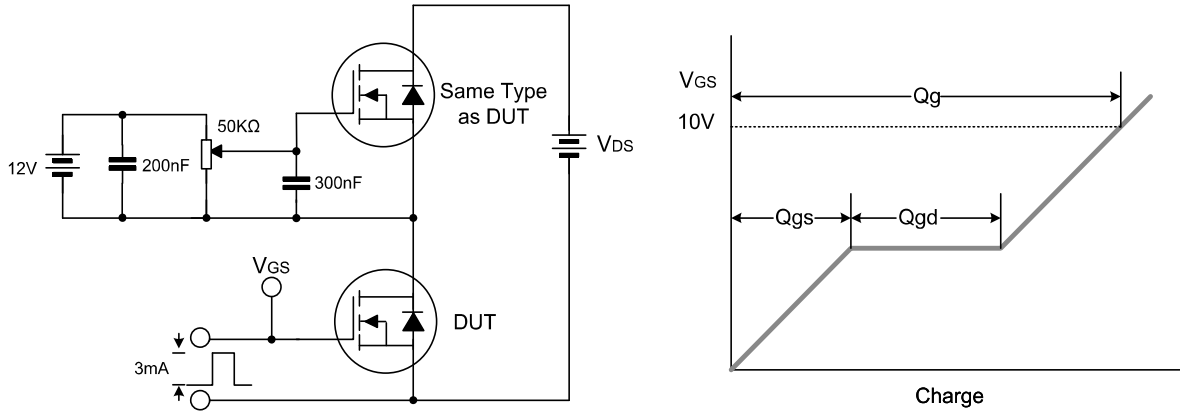
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	900	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 900V, V_{GS} = 0V, T_J = 25^{\circ}\text{C}$	-	-	1	μA
		$V_{DS} = 720V, V_{GS} = 0V, T_J = 125^{\circ}\text{C}$	-	-	10	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 4.5A$	-	0.9	1.3	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1\text{MHz}$	-	2712	-	pF
Output Capacitance	C_{oss}		-	205	-	
Reverse Transfer Capacitance	C_{rss}		-	18	-	
Forward Transconductance	G_{fs}	$V_{DS} = 15V, I_D = 4.5A$	-	10	-	S
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 450V, I_D = 9.0A,$ $V_{GS} = 10V, R_G = 4.7\Omega$	-	15	-	ns
Turn-on rise time	t_r		-	8	-	
Turn-off delay time	$t_{d(off)}$		-	69	-	
Turn-off fall time	t_f		-	25	-	
Total Gate Charge	Q_g	$V_{DS} = 450V, I_D = 9.0A,$ $V_{GS} = 10V$	-	62	-	nC
Gate-Source Charge	Q_{gs}		-	10	-	
Gate-Drain Charge	Q_{gd}		-	21	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	$V_{GS} = 0V, I_S = 9.0A$	-	-	1.5	V
Diode Forward current	I_S		-	-	9.0	A
Body Diode Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_F = 9.0A,$		305		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$dI_F/dt = 100A/\mu s$		1.96		μC

Notes:

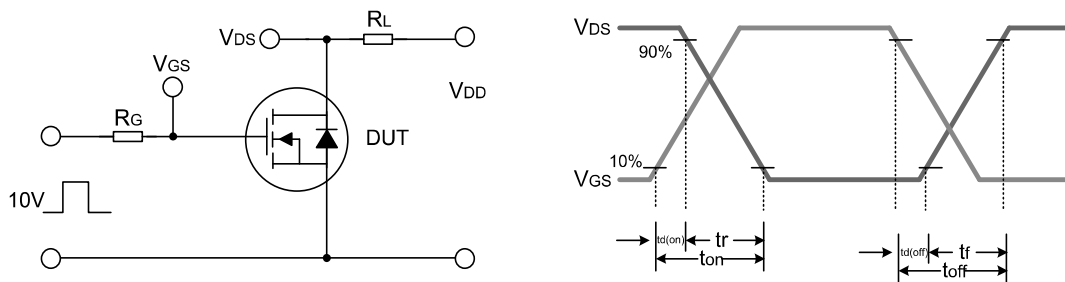
- 1.Repetitive Rating:pulse width limited by maximum junction temperature.
2. $I_{SD} = 9A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS}, \text{Start } T_J = 25^{\circ}\text{C};$
3. $L = 20mH, R_g = 25\Omega, V_{DD} = 50V, I_{AS} = 10A, \text{starling } T_J = 25^{\circ}\text{C}.$

Test Circuit

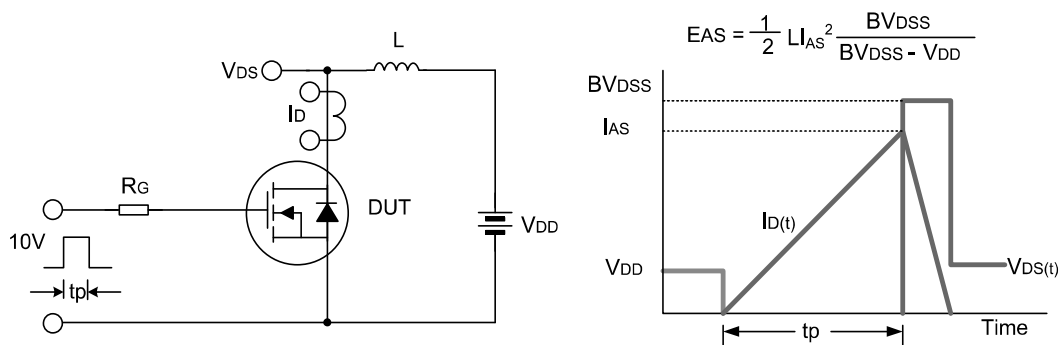
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Typical Performance Characteristics

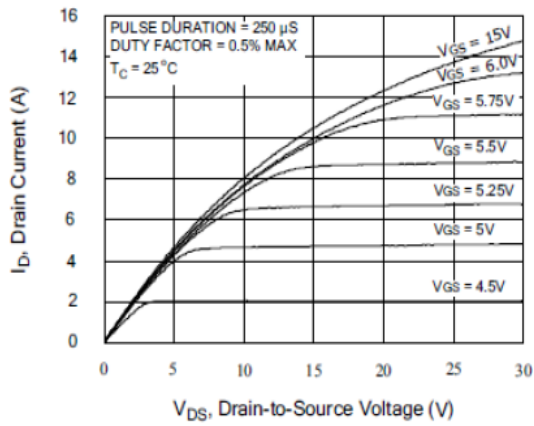


Figure 1 Typical Output Characteristics

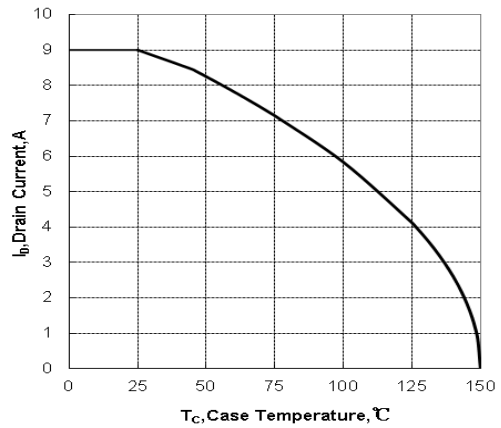


Figure 2 Maximum Continuous Drain Current vs Case Temperature

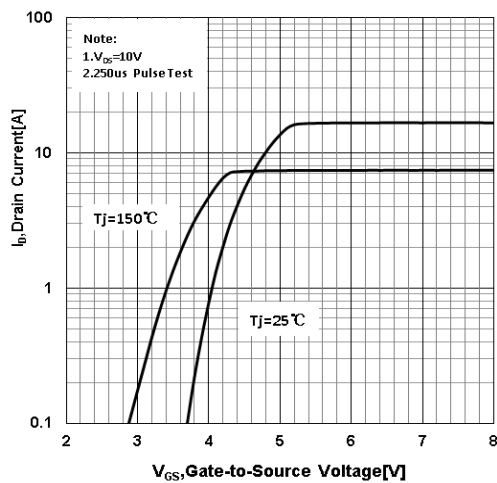


Figure 3 Typical Transfer Characteristics

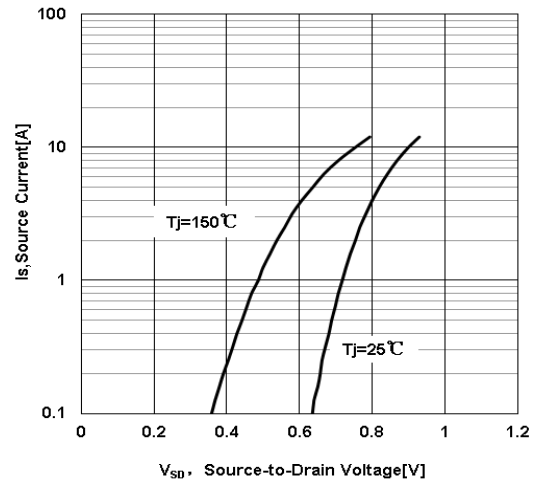


Figure 4 Typical Body Diode Transfer Characteristics

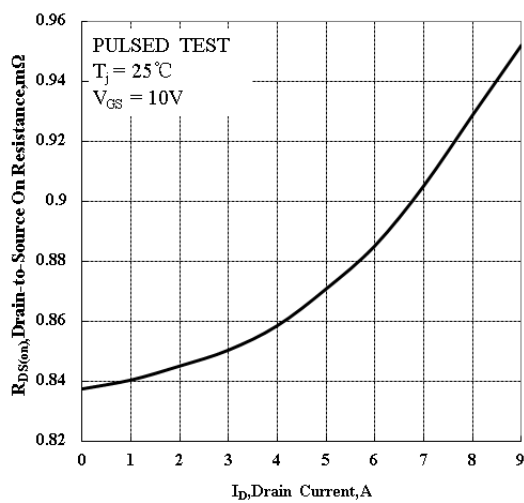


Figure 5 Typical Drain to Source ON Resistance vs Drain Current

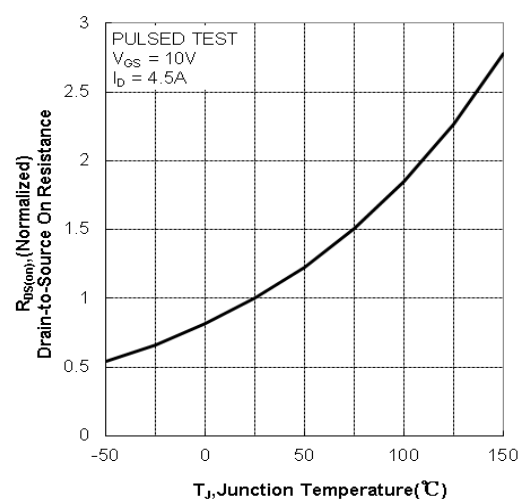


Figure 6 Typical Drain to Source on Resistance vs Junction Temperature

Typical Performance Characteristics

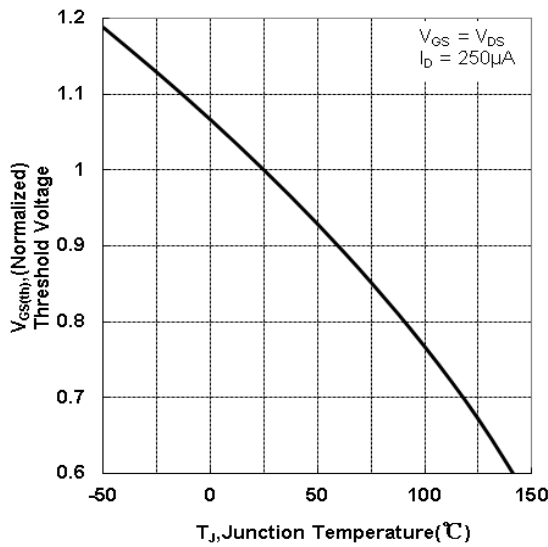


Figure 7 Typical Theshold Voltage vs Junction Temperature

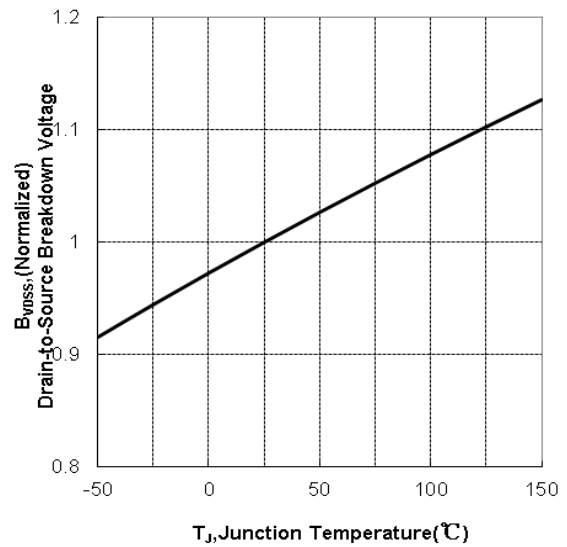


Figure 8 Typical Breakdown Voltage vs Junction Temperature

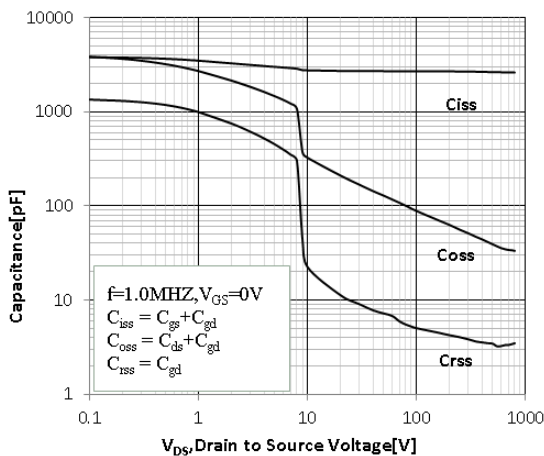


Figure 9 Typical Capacitance vs Drain to Source Voltage

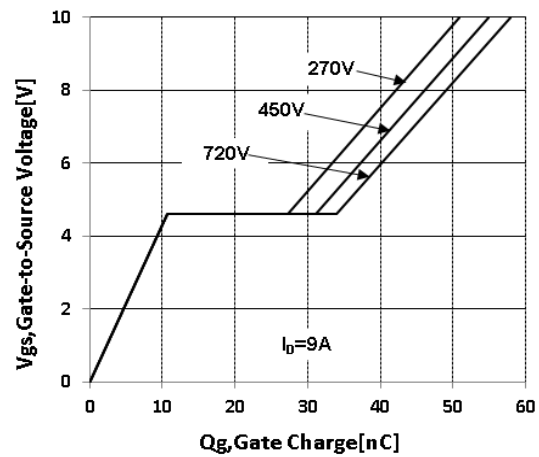


Figure 10 Typical Gate Charge vs Gate to Source Voltage

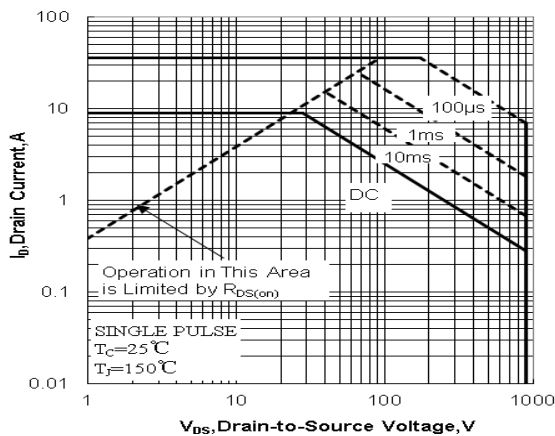


Figure 11 Maximum Forward Bias Safe Operating Area

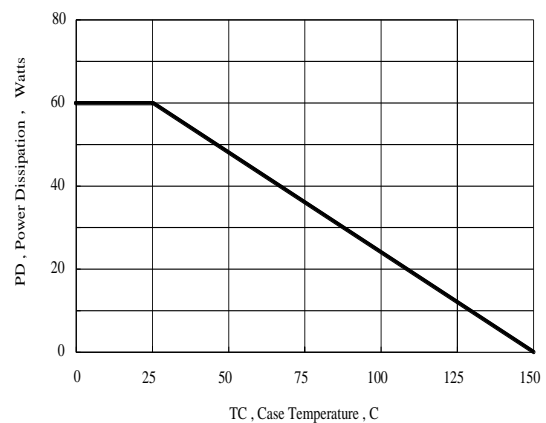


Figure 12 Maximum Power dissipation vs Case Temperature

Typical Performance Characteristics

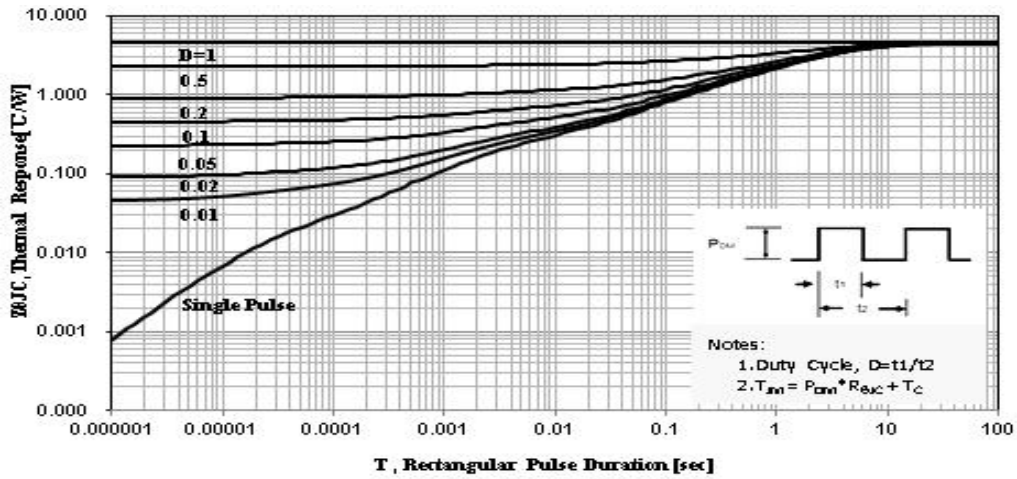
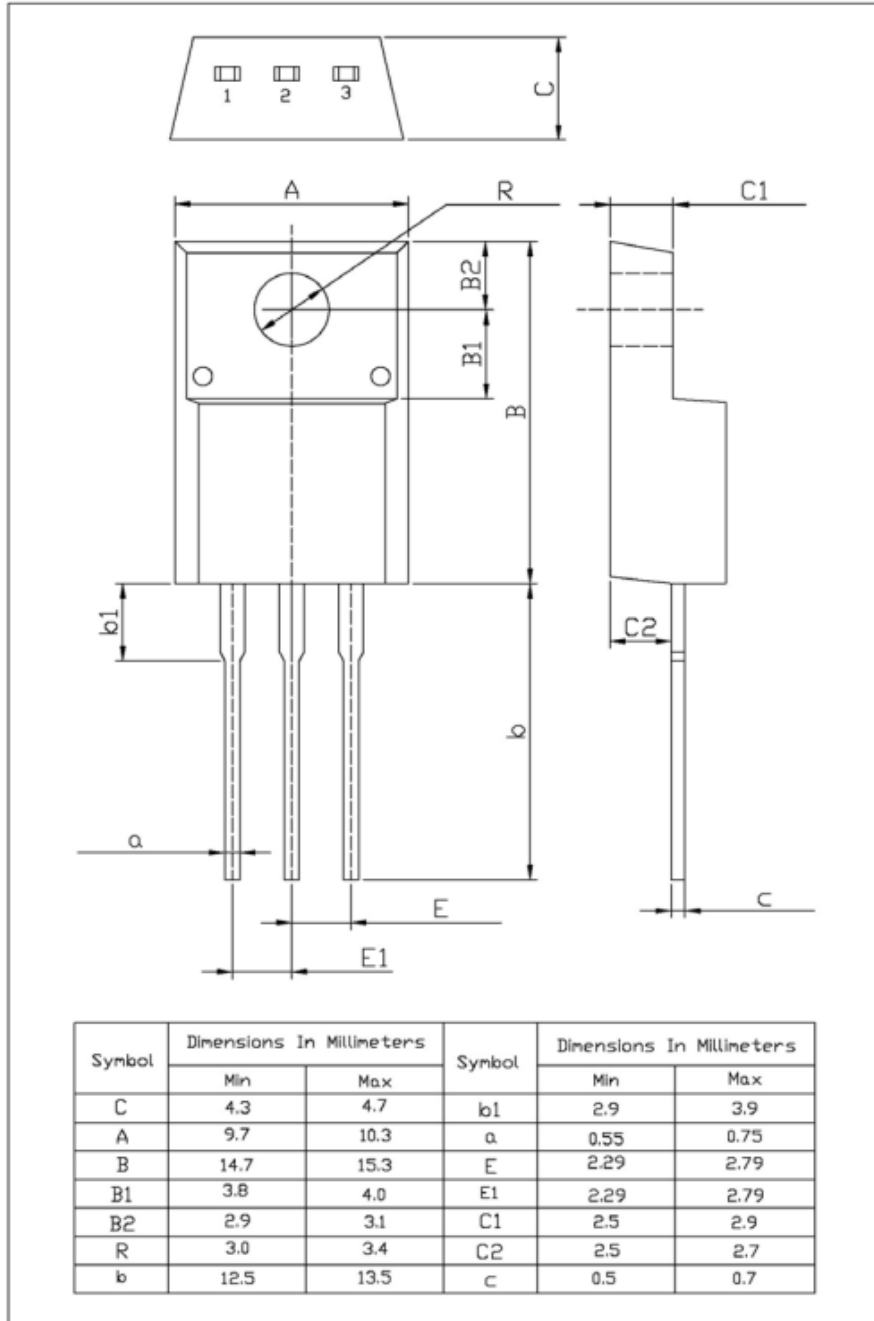


Figure 13 Maximum Effective Thermal Impedance , Junction to Case

Package Dimensions of TO-220F



Revision History

Revision	Release	Remark
V1.0	2023/11/27	Initial Release

Disclaimer

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings, operating conditions, or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.