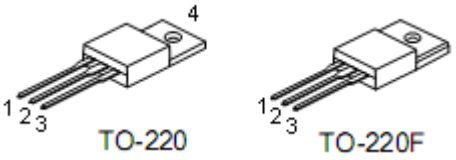
1.Description

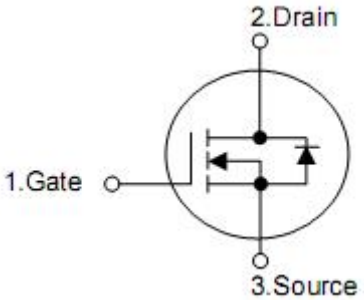
The KIA12N60H N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as high efficiency switched mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.

2. Features

- $R_{DS(on)}$= 0.53Ω @ V_{GS}= 10 V
- Low gate charge (typical 52nC)
- Fast switching capability
- avalanche energy specified
- Improved dv/dt capability

3. Pin configuration





Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Absolute maximum ratings

(TC= 25 ºC , unless otherwise specified)

Parameter		Symbol	Rating		Units
			TO-220	TO-220F	
Drain-source voltage		V_{DSS}	600		V
Drain-source voltage		V_{GSS}	±30		V
Drain current continuous	T_C=25 ºC	I_D	12.0	12.0*	A
	T_C=100 ºC		7.4	7.4*	A
Drain current pulsed (note 1)		I_{DP}	48.0	48*	A
Avalanche energy	Repetitive (note 1)	E_{AR}	23.1		mJ
	Single pulse (note 2)	E_{AS}	865		mJ
Peak diode recovery dv/dt (note 3)		dv/dt	4.5		V/ns
Total power dissipation	T_C=25 ºC	P_D	231	54	W
	derate above 25 ºC		1.85	0.43	W/ºC
Junction temperature		T_J	+150		ºC
Storage temperature		T_{STG}	-55~+150		ºC

*Drain current limited by maximum junction temperature.

5. Thermal characteristics

Parameter	Symbol	Rating		Unit
		TO-220	TO-220F	
Thermal resistance,Junction--ambient	R_{thJA}	62.5		ºC/W
Thermal resistance,case-to-sink typ.	R_{thCS}	0.5	-	ºC/W
Thermal resistance,Junction-case	R_{thJC}	0.54	2.33	ºC/W

6. Electrical characteristics

(T_J=25°C,unless otherwise notes)

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics							
Drain-source breakdown voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	600	-	-	V
Zero gate voltage drain current		I_{DSS}	V_{DS}=600V ,V_{GS}=0V	-	-	1	μA
			V_{DS}=480V ,T_C=125ºC	-	-	10	μA
Gate-body leakage current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V	-	-	100	nA
	Reverse		V_{GS}=-30V,V_{DS}=0V	-	-	-100	nA
Breakdown voltage temperature coefficient		△BV_{DSS}/△T_J	I_D=250μA	-	0.7	-	V/°C
On characteristics							
Gate threshold voltage		$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.0	-	4.0	V
Static drain-source on-resistance		$R_{DS(on)}$	V_{GS}=10V,I_D=6.0A	-	0.53	0.65	Ω
Dynamic characteristics							
Input capacitance		C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1MHz	-	1850	-	pF
Output capacitance		C_{oss}		-	180	-	pF
Reverse transfer capacitance		C_{rss}		-	20	-	pF
Switching characteristics							
Turn-on delay time		$t_{d(on)}$	V_{DD}=300V,I_D=12.0A, R_G=25Ω(note4,5)	-	30	-	ns
Rise time		t_r		-	90	-	ns
Turn-off delay time		$t_{d(off)}$		-	140	-	ns
fall time		t_f		-	90	-	ns
Total gate charge		Q_g	V_{DS}=480V,I_D=12.0A V_{GS}=10V,(note4,5)	-	52	-	nC
Gate-source charge		Q_{gs}		-	8.5	-	nC
Gate-drain charge		Q_{gd}		-	20	-	nC
Drain-source diode characteristics							
Drain-source diode forward voltage		V_{SD}	V_{GS}=0V,I_{SD}=12.0A	-	-	1.4	V
Continuous drain-source current		I_{SD}		-	-	12.0	A
Pulsed drain-source current		I_{SM}		-	-	48.0	A
Reverse recovery time		t_{rr}	I_{SD}=12.0A dI$_{SD}$/dt=100A/μs (note4)	-	430	-	ns
Reverse recovery charge		Q_{rr}		-	5.0	-	μC

Note: 1.repetitive rating : pulse width limited by maximum junction temperature

2.L=11mH,I_{AS}=12.0A,V_{DD}=50V,R_G=25Ω,staring T_J=25ºC

3.I_{SD}≤12.0A,di/dt≤200A/μs,V_{DD}≤BV_{DSS},staring T_J=25 ºC

4.Pulse test:pulse width≤300μs,duty cycle≤2%

5.Essentially independent of operating temperature

7.Test circuits and waveforms

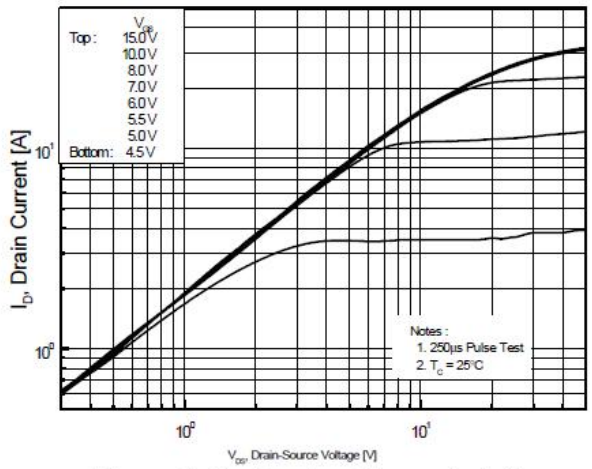


Figure 1. On-Region Characteristics

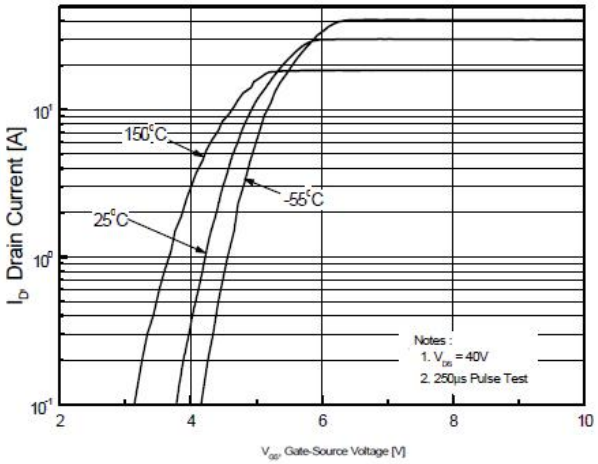


Figure 2. Transfer Characteristics

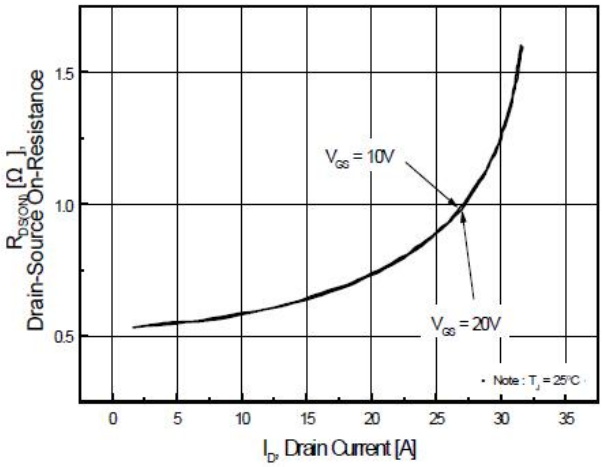


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

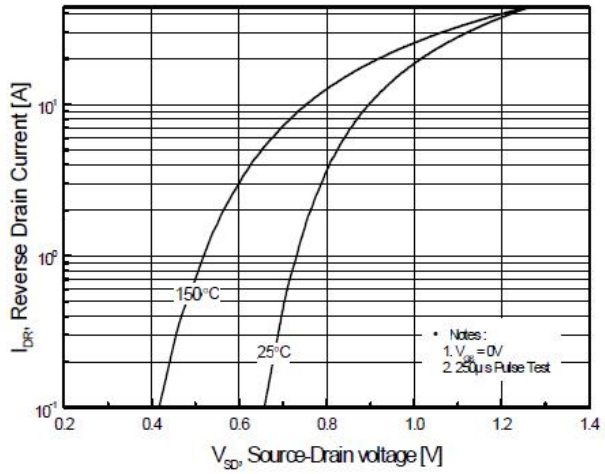


Figure 4. Body Diode Forward Voltage Variation with Source Currentand Temperature

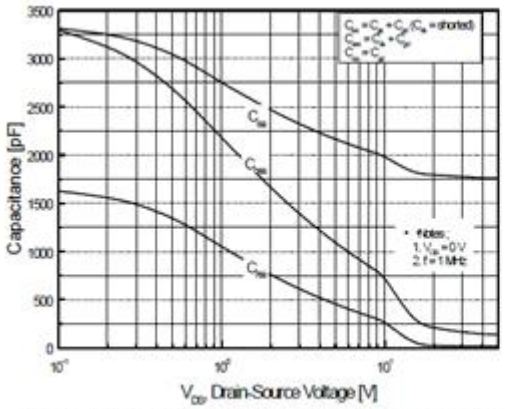


Figure 5. Capacitance Characteristics

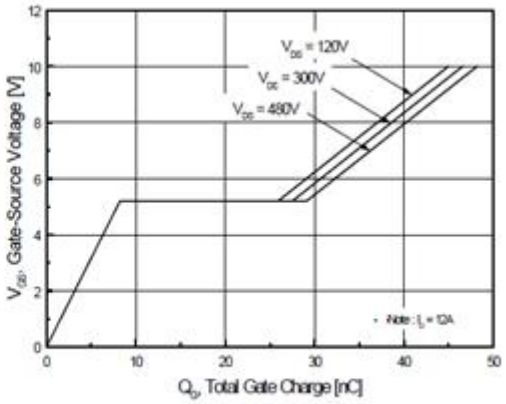


Figure 6. Gate Charge Characteristics

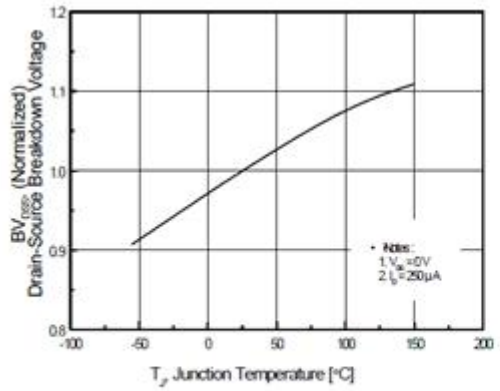


Figure 7. Breakdown Voltage Variation vs Temperature

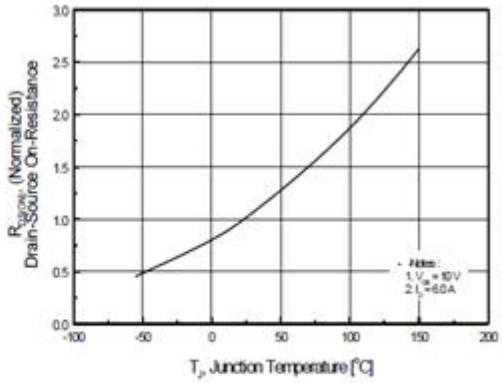


Figure 2. Transfer Characteristics

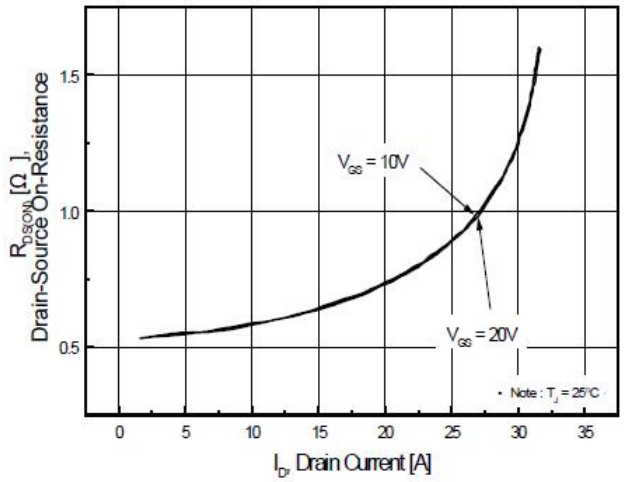


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

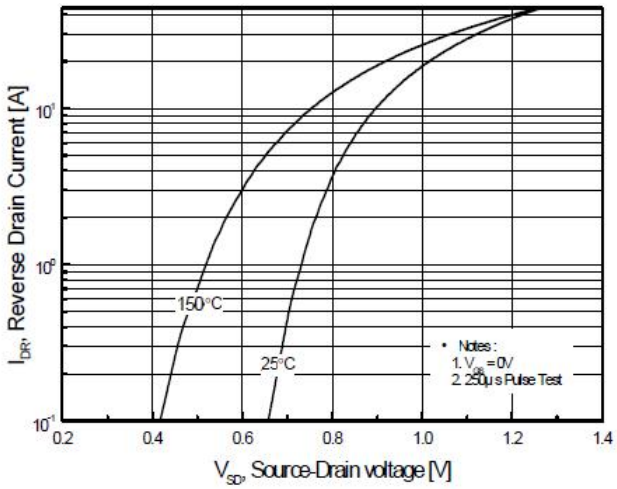


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

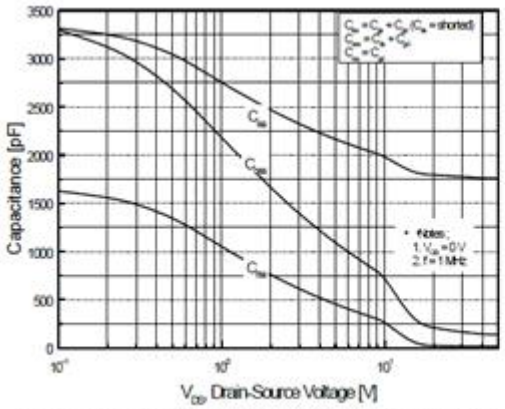


Figure 5. Capacitance Characteristics

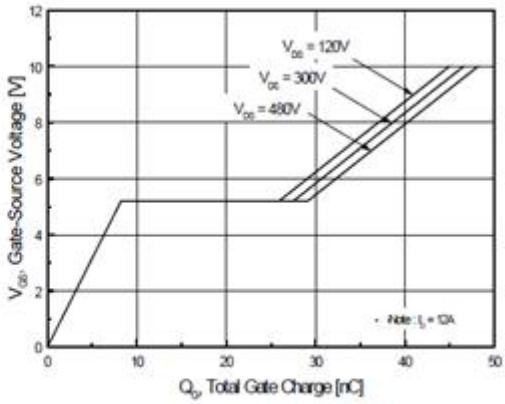


Figure 6. Gate Charge Characteristics

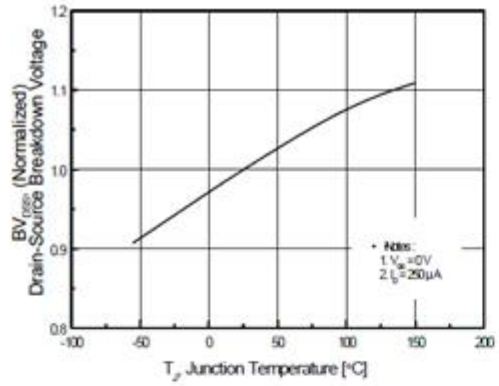


Figure 7. Breakdown Voltage Variation vs Temperature

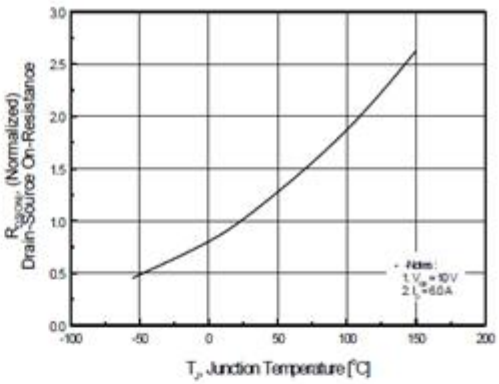


Figure 8. On-Resistance Variation vs Temperature

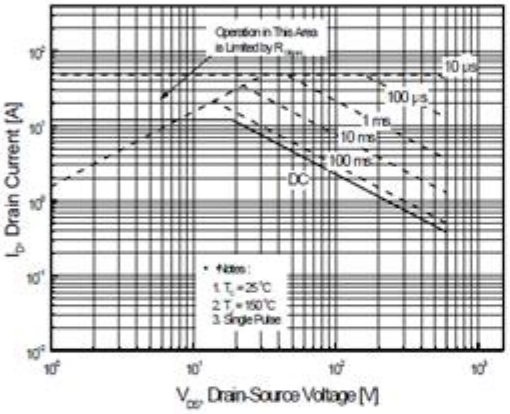


Figure 9-1. Maximum Safe Operating Area for TO220

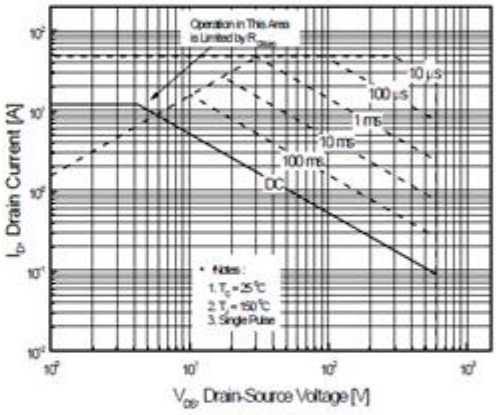


Figure 9-2. Maximum Safe Operating Area for TO220F

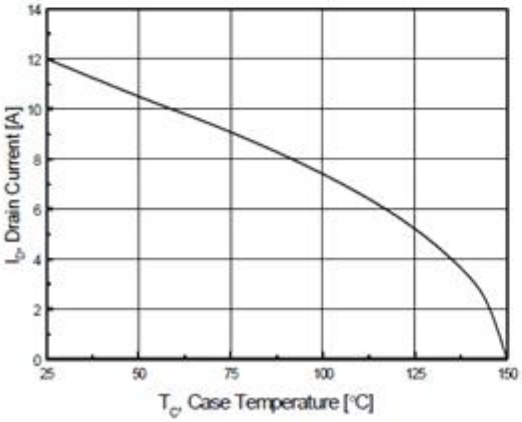


Figure 10. Maximum Drain Current vs Case Temperature

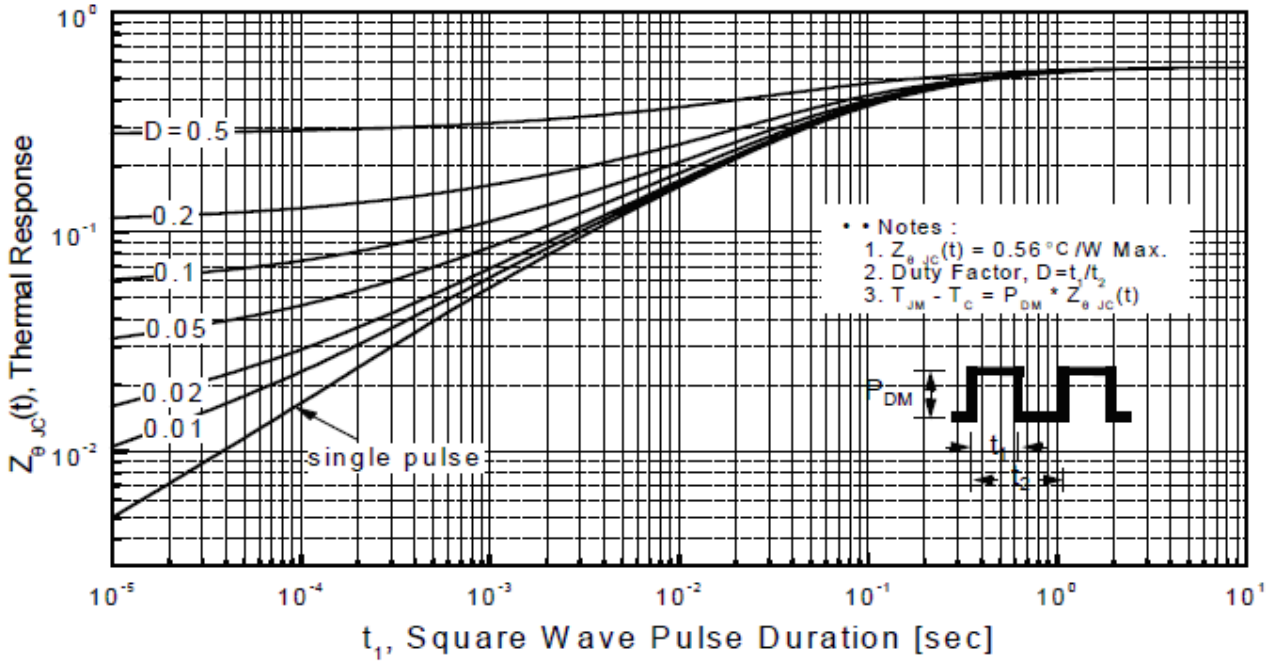


Figure 11-1. Transient Thermal Response Curve for TO220

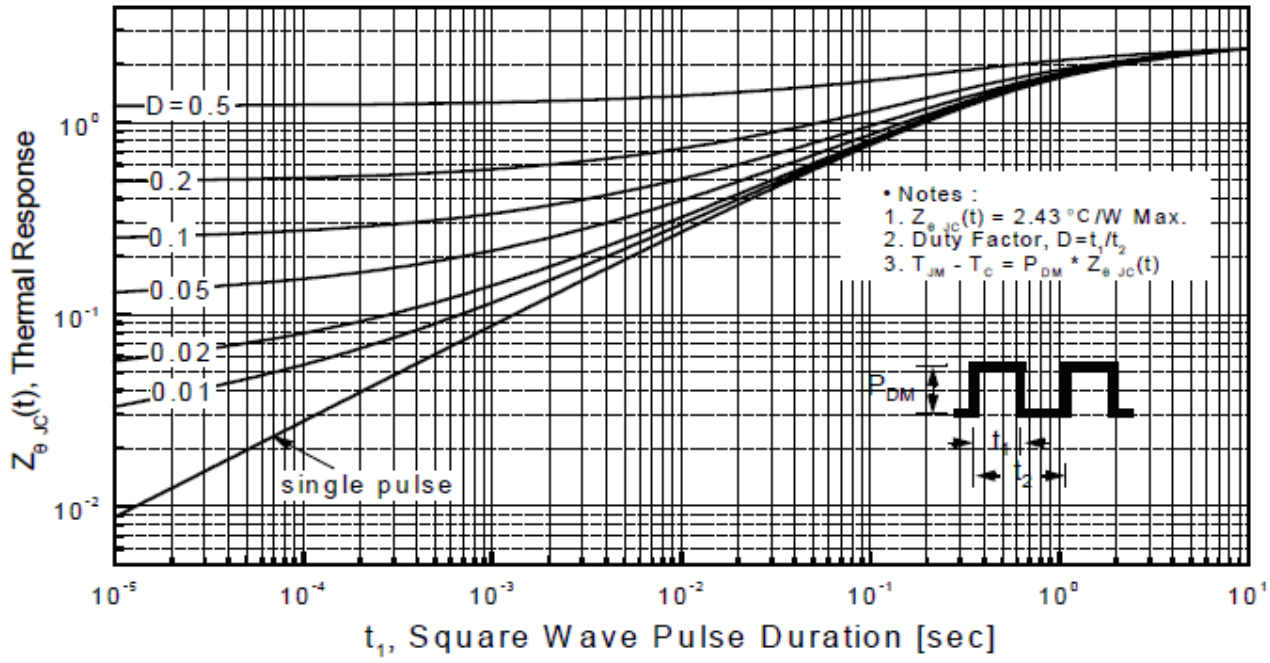


Figure 11-2. Transient Thermal Response Curve for TO220F