

FGA25N120AND

General Description

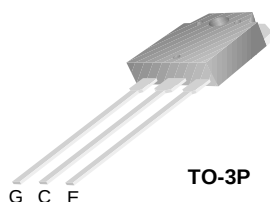
Employing NPT technology, Fairchild's AND series of IGBTs provides low conduction and switching losses. The AND series offers an solution for application such as induction heating (IH), motor control, general purpose inverters and uninterruptible power supplies (UPS).

Features

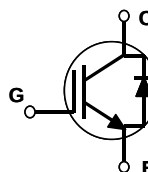
- High speed switching
- Low saturation voltage : $V_{CE(sat)} = 2.5 \text{ V @ } I_C = 25\text{A}$
- High input impedance
- CO-PAK, IGBT with FRD : $t_{rr} = 235\text{ns (typ.)}$

Applications

Induction Heating, UPS, AC & DC motor controls and general purpose inverters.



TO-3P



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

Symbol	Description	FGA25N120AND	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	40	A
	Collector Current @ $T_C = 100^\circ\text{C}$	25	A
$I_{CM(1)}$	Pulsed Collector Current	75	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	25	A
I_{FM}	Diode Maximum Forward Current	150	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	310	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	125	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Notes :

(1) Repetitive rating : Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.4	$^\circ\text{C/W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	2.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ\text{C/W}$

Electrical Characteristics of the IGBT $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 3mA$	1200	--	--	V
$\Delta BV_{CES}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	$V_{GE} = 0V, I_C = 3mA$	--	0.6	--	$V/^\circ\text{C}$
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	3	mA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	± 100	nA

On Characteristics

$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 25mA, V_{CE} = V_{GE}$	3.5	5.5	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 25A, V_{GE} = 15V$	--	2.5	3.2	V
		$I_C = 25A, V_{GE} = 15V, T_C = 125^\circ\text{C}$	--	2.9	--	V
		$I_C = 40A, V_{GE} = 15V$	--	3.1	--	V

Dynamic Characteristics

C_{ies}	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V, f = 1MHz$	--	2100	--	pF
C_{oes}	Output Capacitance		--	180	--	pF
C_{res}	Reverse Transfer Capacitance		--	90	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 25A, R_G = 10\Omega, V_{GE} = 15V, \text{Inductive Load}, T_C = 25^\circ\text{C}$	--	60	--	ns
t_r	Rise Time		--	60	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	170	--	ns
t_f	Fall Time		--	45	90	ns
E_{on}	Turn-On Switching Loss		--	4.8	7.2	mJ
E_{off}	Turn-Off Switching Loss		--	1.0	1.5	mJ
E_{ts}	Total Switching Loss	$V_{CC} = 600V, I_C = 25A, R_G = 10\Omega, V_{GE} = 15V, \text{Inductive Load}, T_C = 125^\circ\text{C}$	--	5.7	8.7	mJ
$t_{d(on)}$	Turn-On Delay Time		--	60	--	ns
t_r	Rise Time		--	60	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	180	--	ns
t_f	Fall Time		--	70	--	ns
E_{on}	Turn-On Switching Loss		--	5.5	--	mJ
E_{off}	Turn-Off Switching Loss	$V_{CE} = 600V, I_C = 25A, V_{GE} = 15V$	--	1.4	--	mJ
E_{ts}	Total Switching Loss		--	6.9	--	mJ
Q_g	Total Gate Charge		--	200	300	nC
Q_{ge}	Gate-Emitter Charge	Measured 5mm from PKG	--	15	23	nC
Q_{gc}	Gate-Collector Charge		--	105	160	nC
L_e	Internal Emitter Inductance		--	14	--	nH

Electrical Characteristics of DIODE $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _{FM}	Diode Forward Voltage	I _F = 25A	T _C = 25°C	--	2.0	3.0	V
			T _C = 125°C	--	2.1	--	
t _{rr}	Diode Reverse Recovery Time	I _F = 25A dI/dt = 200 A/μs	T _C = 25°C	--	235	350	ns
			T _C = 125°C	--	300	--	
I _{rr}	Diode Peak Reverse Recovery Current		T _C = 25°C	--	27	40	A
			T _C = 125°C	--	31	--	
Q _{rr}	Diode Reverse Recovery Charge		T _C = 25°C	--	3130	4700	nC
			T _C = 125°C	--	4650	--	

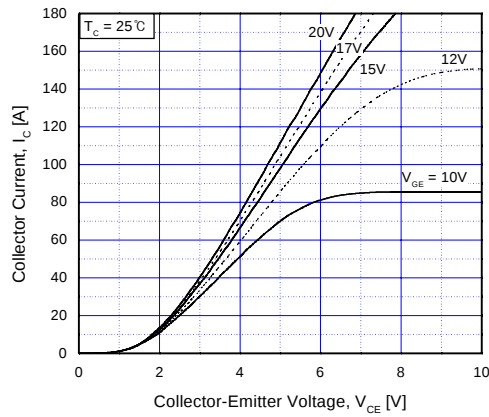


Fig 1. Typical Output Characteristics

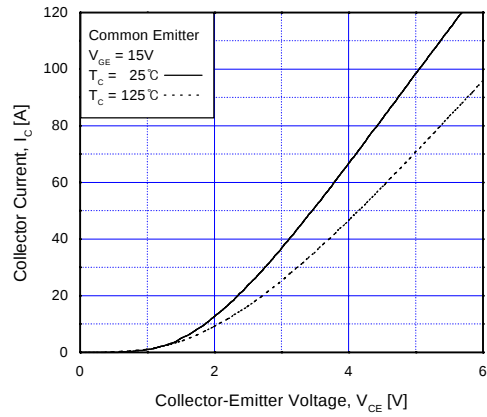


Fig 2. Typical Saturation Voltage Characteristics

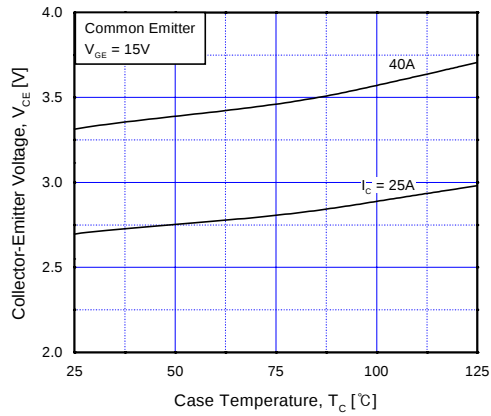


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

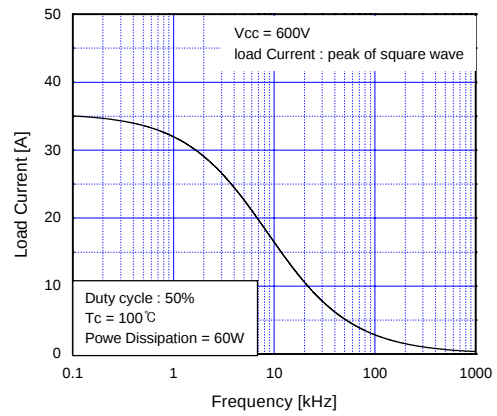


Fig 4. Load Current vs. Frequency

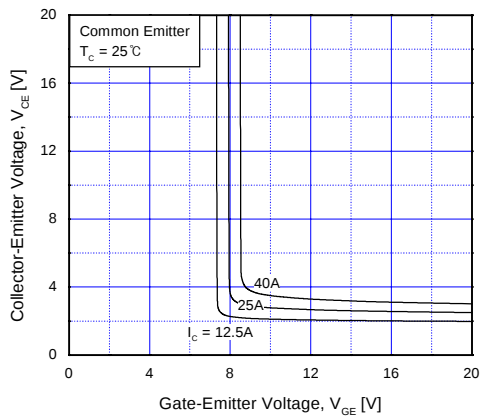


Fig 5. Saturation Voltage vs. V_{GE}

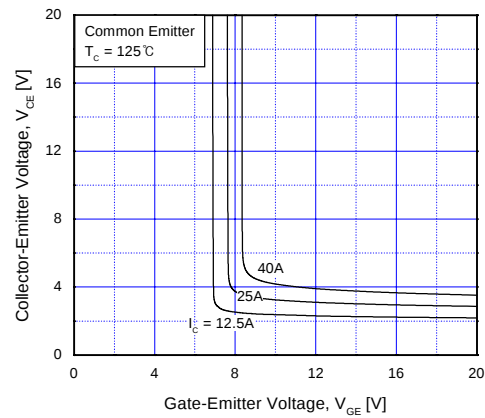


Fig 6. Saturation Voltage vs. V_{GE}

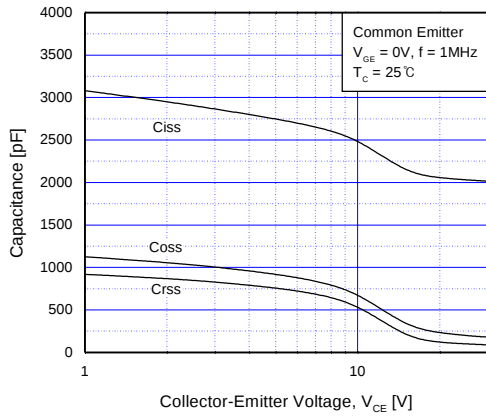


Fig 7. Capacitance Characteristics

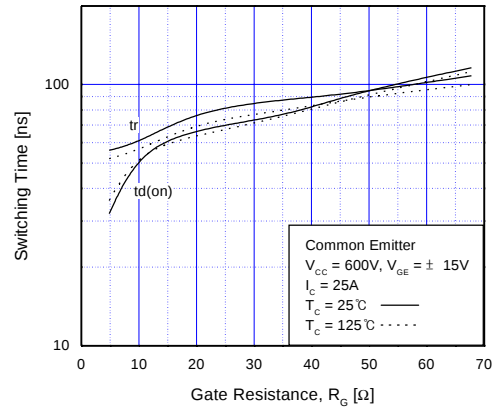


Fig 8. Turn-On Characteristics vs. Gate Resistance

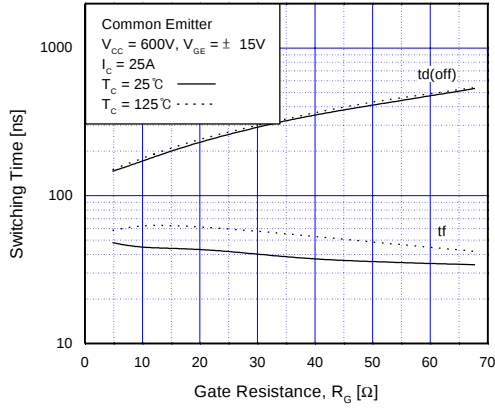


Fig 9. Turn-Off Characteristics vs. Gate Resistance

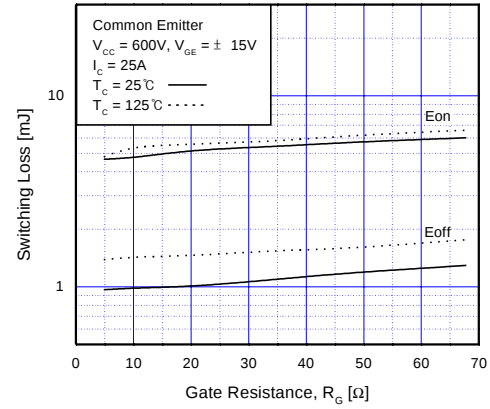


Fig 10. Switching Loss vs. Gate Resistance

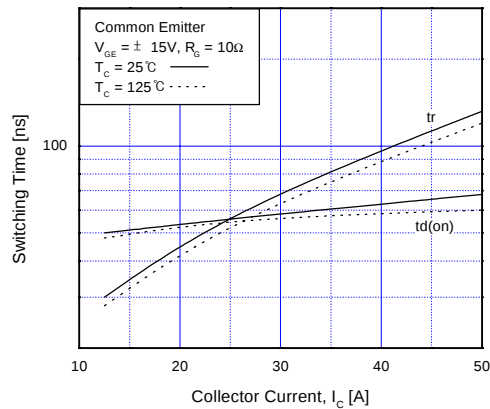


Fig 11. Turn-On Characteristics vs. Collector Current

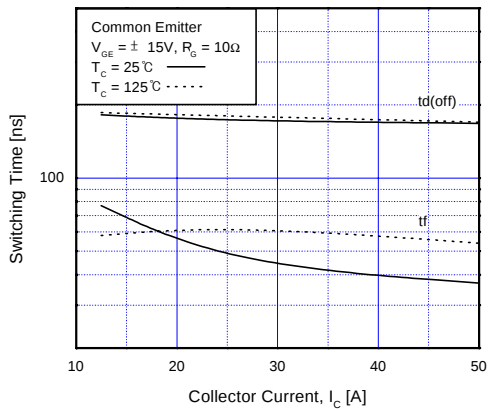


Fig 12. Turn-Off Characteristics vs. Collector Current

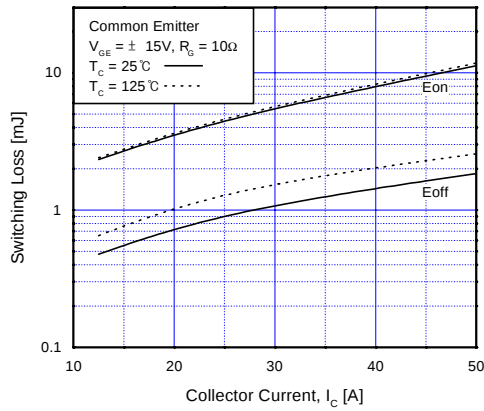


Fig 13. Switching Loss vs. Collector Current

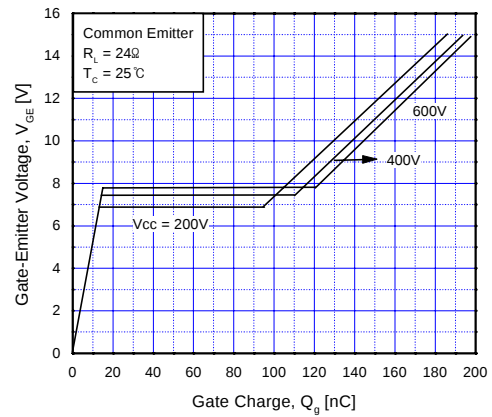


Fig 14. Gate Charge Characteristics

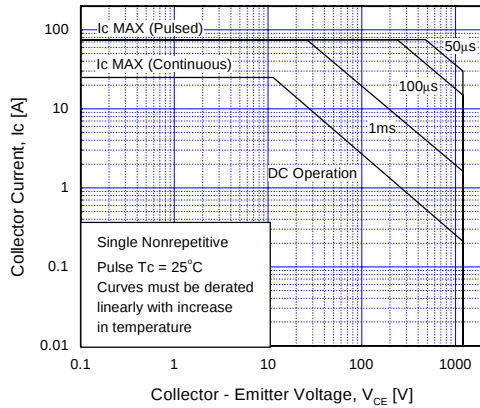


Fig 15. SOA Characteristics

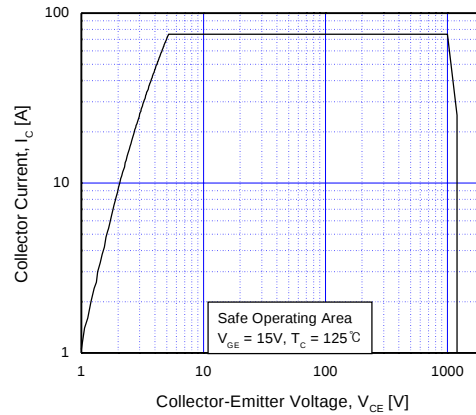


Fig 16. Turn-Off SOA

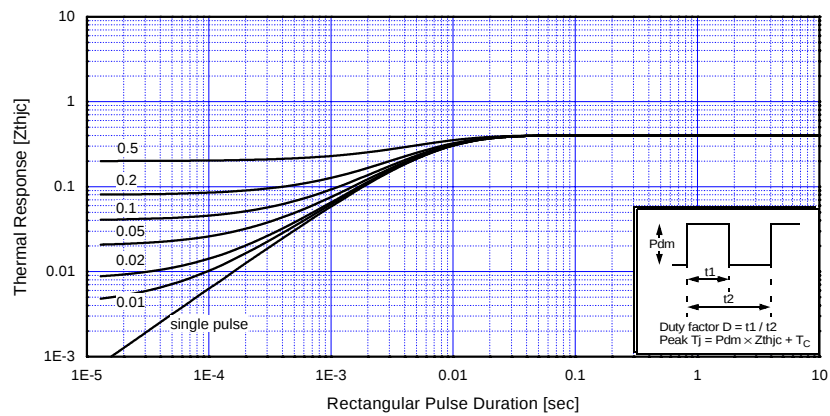


Fig 17. Transient Thermal Impedance of IGBT

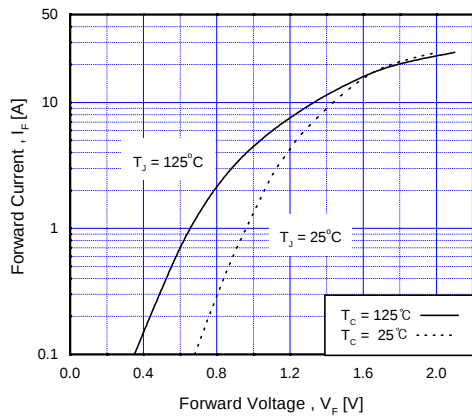


Fig 18. Forward Characteristics

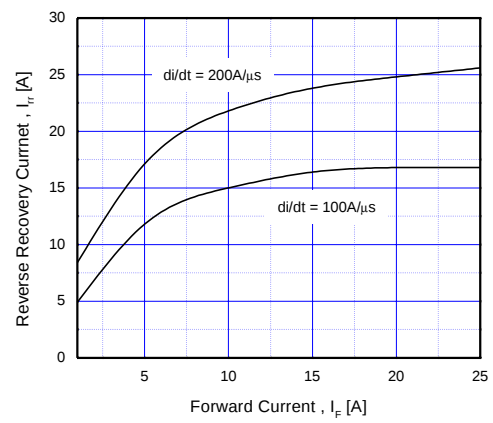


Fig 19. Reverse Recovery Current

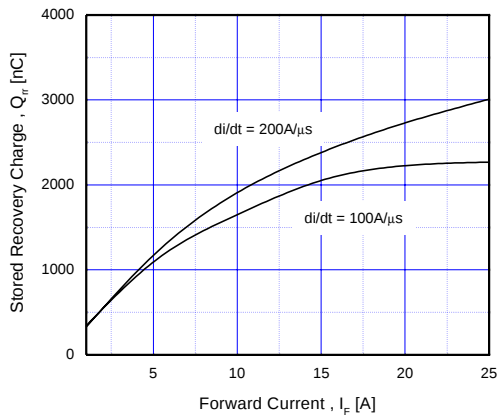


Fig 20. Stored Charge

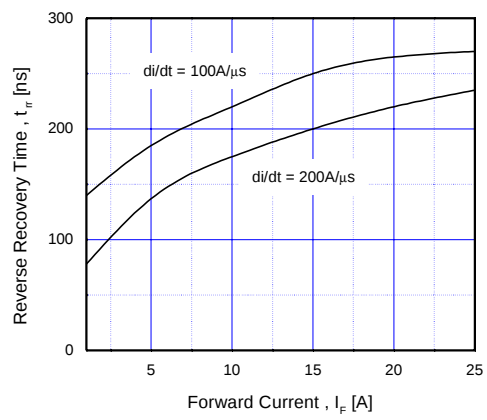
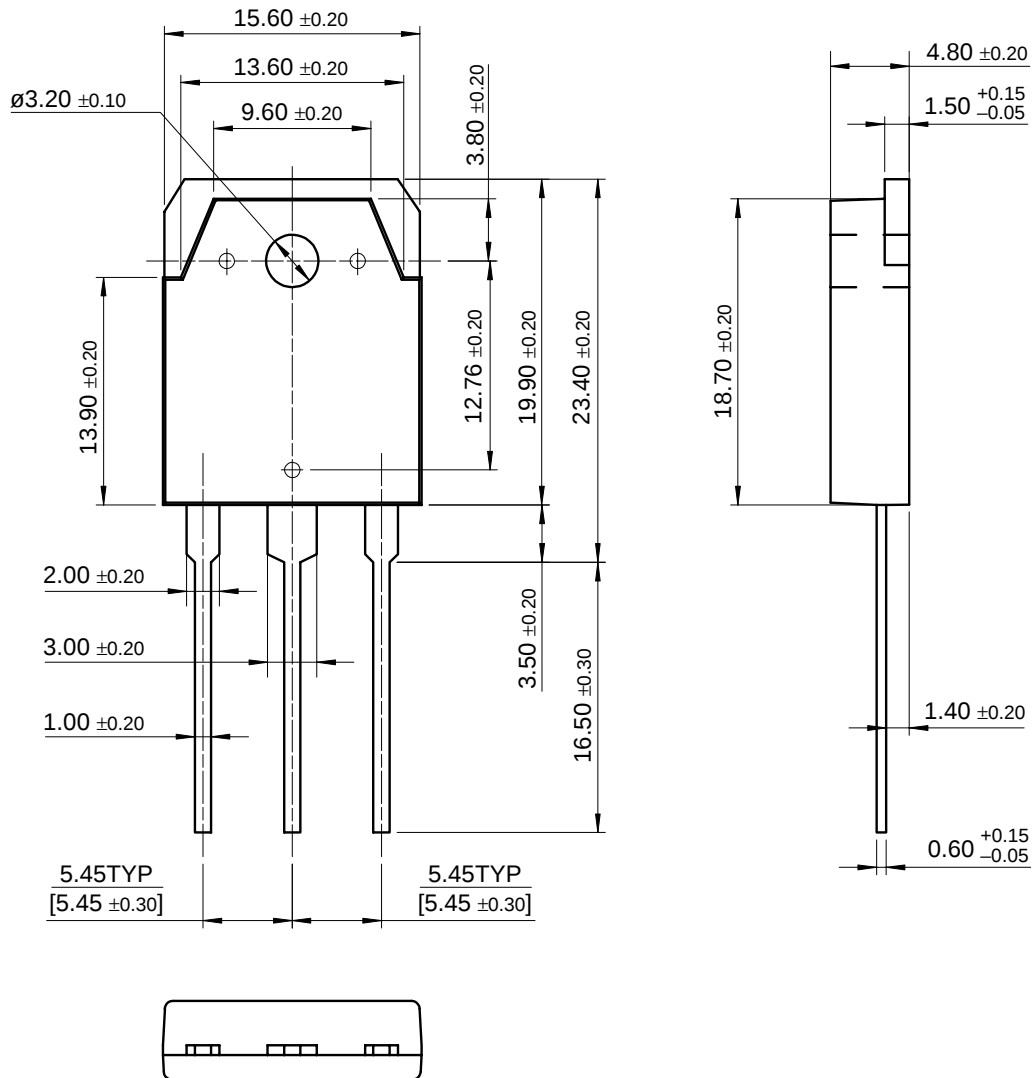


Fig 21. Reverse Recovery Time

Package Dimension

TO-3P



Dimensions in Millimeters

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