



# FGA120N30D

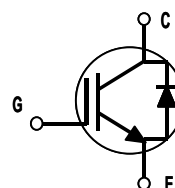
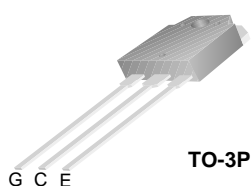
## 300V PDP IGBT

### Features

- High Current Capability
- Low saturation voltage:  $V_{CE(sat)}$ , Typ = 1.1V @  $I_C = 25A$
- High Input Impedance

### Description

Employing Unified IGBT Technology, FGA120N30D provides low conduction and switching loss. FGA120N30D offers the optimum solution for PDP applications where low conduction loss is essential.



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

Symbol	Description	FGA120N30D	Units
$V_{CES}$	Collector-Emitter Voltage	300	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 30$	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	120	A
$I_{CM}$	Pulsed Collector Current (Note 1) @ $T_C = 25^\circ\text{C}$	300	A
$I_F$	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	10	A
$I_{FM}$	Diode Maximum Forward Current	40	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	290	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	116	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 test , pulse width = 100usec , Duty = 0.2

\*  $I_{c\_pulse}$  limited by max  $T_J$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction-to-Case for IGBT	--	0.43	$^\circ\text{C}/\text{W}$
$R_{\theta JC}(DIODE)$	Thermal Resistance, Junction-to-Case for Diode	--	1.56	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ\text{C}/\text{W}$

## Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGA120N30D	FGA120N30D	TO-3P	--	--	30

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	300	--	--	V
$\Delta BV_{CES}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	--	0.6	--	$V/^\circ\text{C}$
$I_{CES}$	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	100	$\mu A$
$I_{GES}$	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	$\pm 250$	nA
<b>On Characteristics</b>						
$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 250\mu A, V_{CE} = V_{GE}$	2.5	4.0	5.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 25A, V_{GE} = 15V$	--	1.1	1.4	V
		$I_C = 120A, V_{GE} = 15V$	--	1.9	--	V
		$I_C = 120A, V_{GE} = 15V, T_C = 125^\circ\text{C}$	--	2.0	--	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V, f = 1\text{MHz}$	--	2310	-	pF
$C_{oes}$	Output Capacitance		--	360	-	pF
$C_{res}$	Reverse Transfer Capacitance		--	100	-	pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 200V, I_C = 25A, R_G = 8.7\Omega, V_{GE} = 15V, \text{Resistive Load}, T_C = 25^\circ\text{C}$	--	30	--	ns
$t_r$	Rise Time		--	270	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	100	--	ns
$t_f$	Fall Time		--	130	300	ns
$E_{on}$	Turn-On Switching Loss		--	0.17	--	mJ
$E_{off}$	Turn-Off Switching Loss		--	0.56	--	mJ
$E_{ts}$	Total Switching Loss		--	0.73	--	mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 200V, I_C = 25A, R_G = 8.7\Omega, V_{GE} = 15V, \text{Resistive Load}, T_C = 125^\circ\text{C}$	--	30	--	ns
$t_r$	Rise Time		--	280	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	105	--	ns
$t_f$	Fall Time		--	180	--	ns
$E_{on}$	Turn-On Switching Loss		--	0.18	--	mJ
$E_{off}$	Turn-Off Switching Loss		--	0.9	--	mJ
$E_{ts}$	Total Switching Loss		--	1.08	--	mJ
$Q_g$	Total Gate Charge	$V_{CE} = 200V, I_C = 25A, V_{GE} = 15V$	--	120	180	nC
$Q_{ge}$	Gate-Emitter Charge		--	15	22	nC
$Q_{gc}$	Gate-Collector Charge		--	60	90	nC

**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	$I_F = 10\text{A}$	$T_C = 25^\circ\text{C}$	--	1.1	1.4	V
			$T_C = 125^\circ\text{C}$	--	0.9	--	
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 10\text{A}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_C = 25^\circ\text{C}$	--	21	--	ns
			$T_C = 125^\circ\text{C}$	--	35	--	
$I_{rr}$	Diode Peak Reverse Recovery Current		$T_C = 25^\circ\text{C}$	--	2.8	--	A
			$T_C = 125^\circ\text{C}$	--	5.6	--	
$Q_{rr}$	Diode Reverse Recovery Charge		$T_C = 25^\circ\text{C}$	--	29.4	--	nC
			$T_C = 125^\circ\text{C}$	--	98	--	

## Typical Performance Characteristics

Figure 1. Typical Output Characteristics

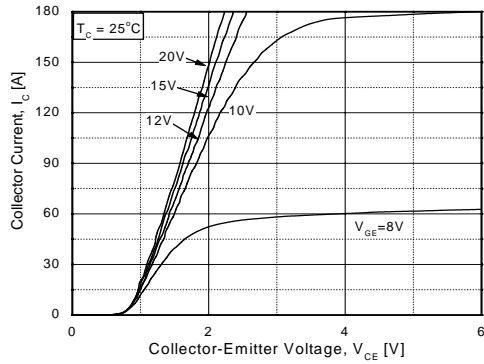


Figure 2. Typical Output Characteristics

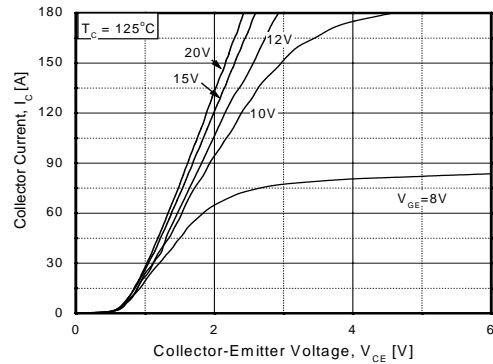


Figure 3. Typical Saturation Voltage Characteristics

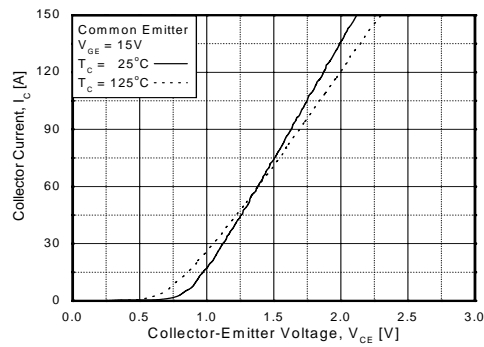


Figure 4. Transfer characteristics

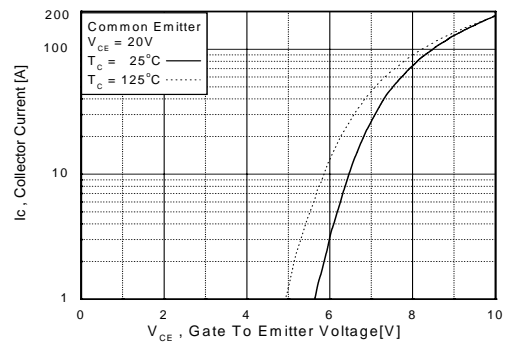


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

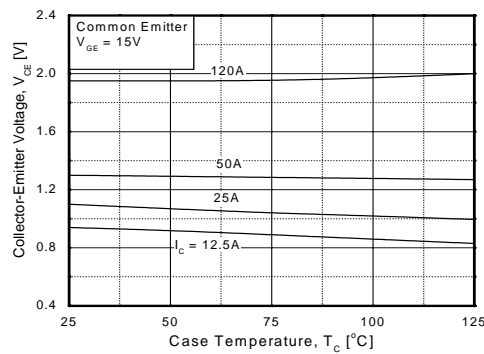
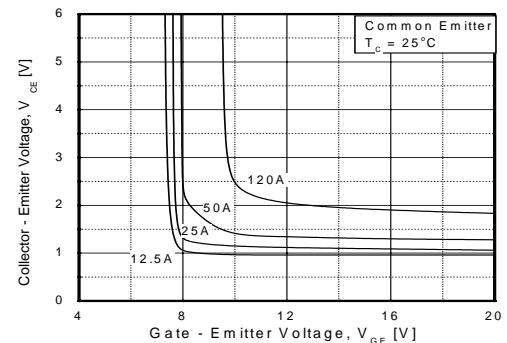
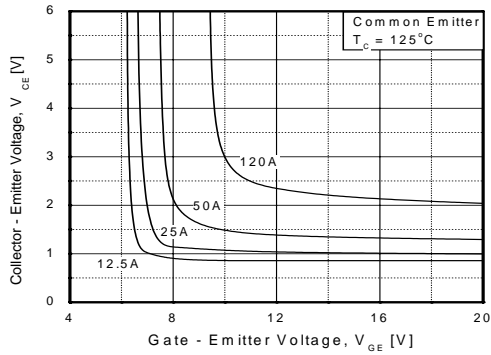


Figure 6. Saturation Voltage vs. Vge

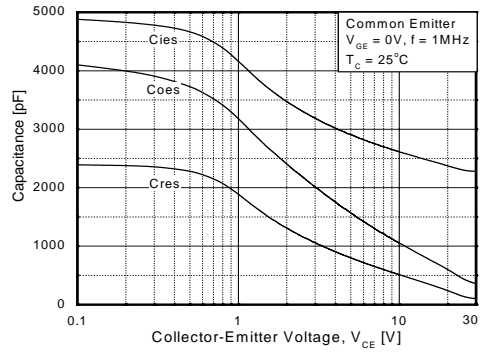


**Typical Performance Characteristics (Continued)**

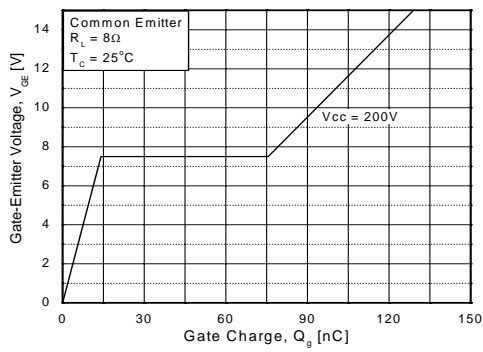
**Figure 7. Saturation Voltage vs.  $V_{GE}$**



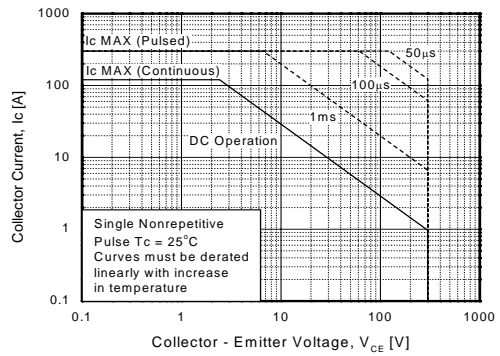
**Figure 8. Capacitance Characteristics**



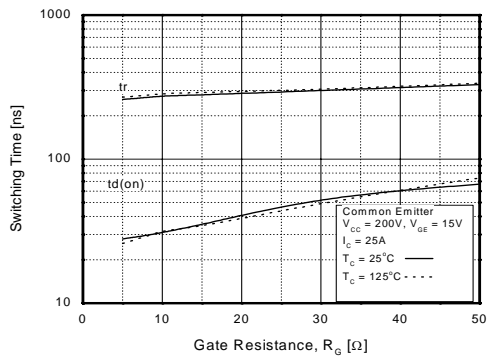
**Figure 9. Gate Charge Characteristics**



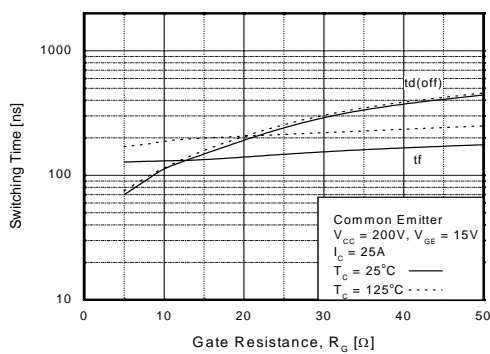
**Figure 10. SOA Characteristics**



**Figure 11. Turn-On Characteristics vs. Gate Resistance**

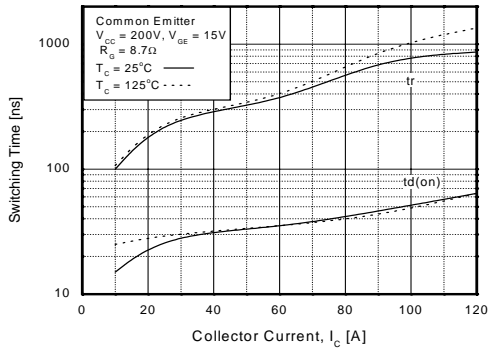


**Figure 12. Turn-Off Characteristics vs. Gate Resistance**

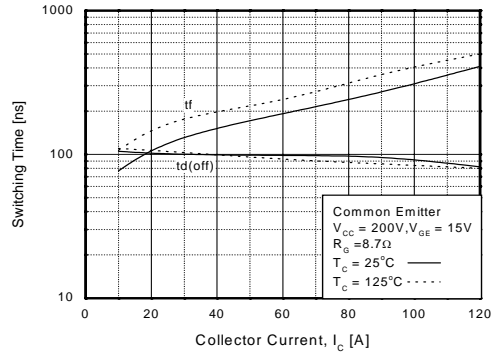


**Typical Performance Characteristics** (Continued)

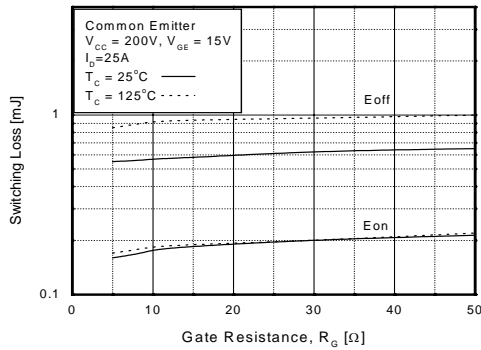
**Figure 13. Turn-On Characteristics vs. Collector Current**



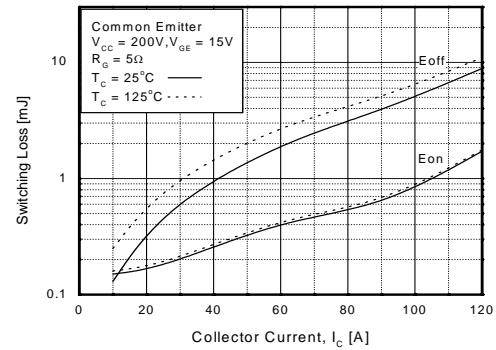
**Figure 14. Turn-Off Characteristics vs. Collector Current**



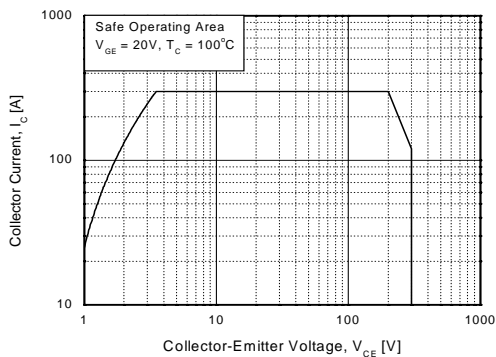
**Figure 15. Switching Loss vs. Gate Resistance**



**Figure 16. Switching Loss vs. Collector Current**

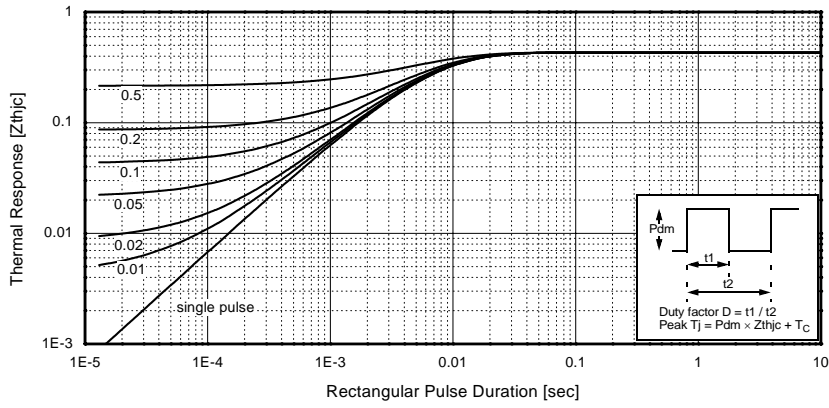


**Figure 17. Turn-Off SOA Figure**

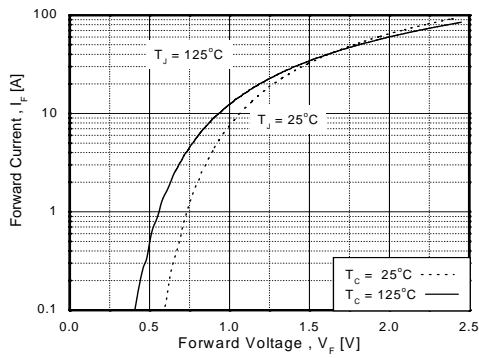


**Typical Performance Characteristics (Continued)**

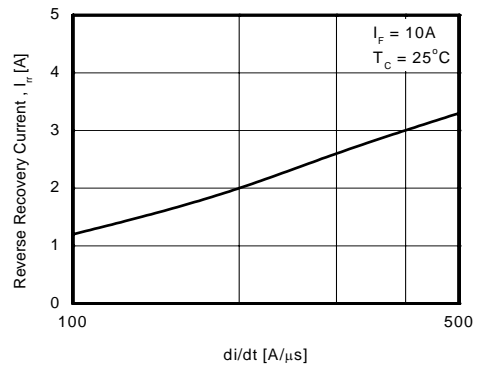
**Figure 18. Transient Thermal Impedance of IGBT**



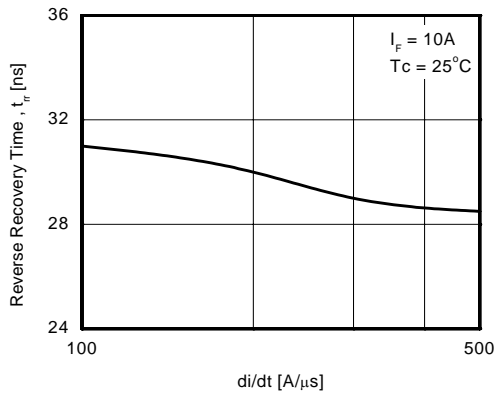
**Figure 19. Forward Characteristics**



**Figure 20. Typical Reverse Recovery Current**

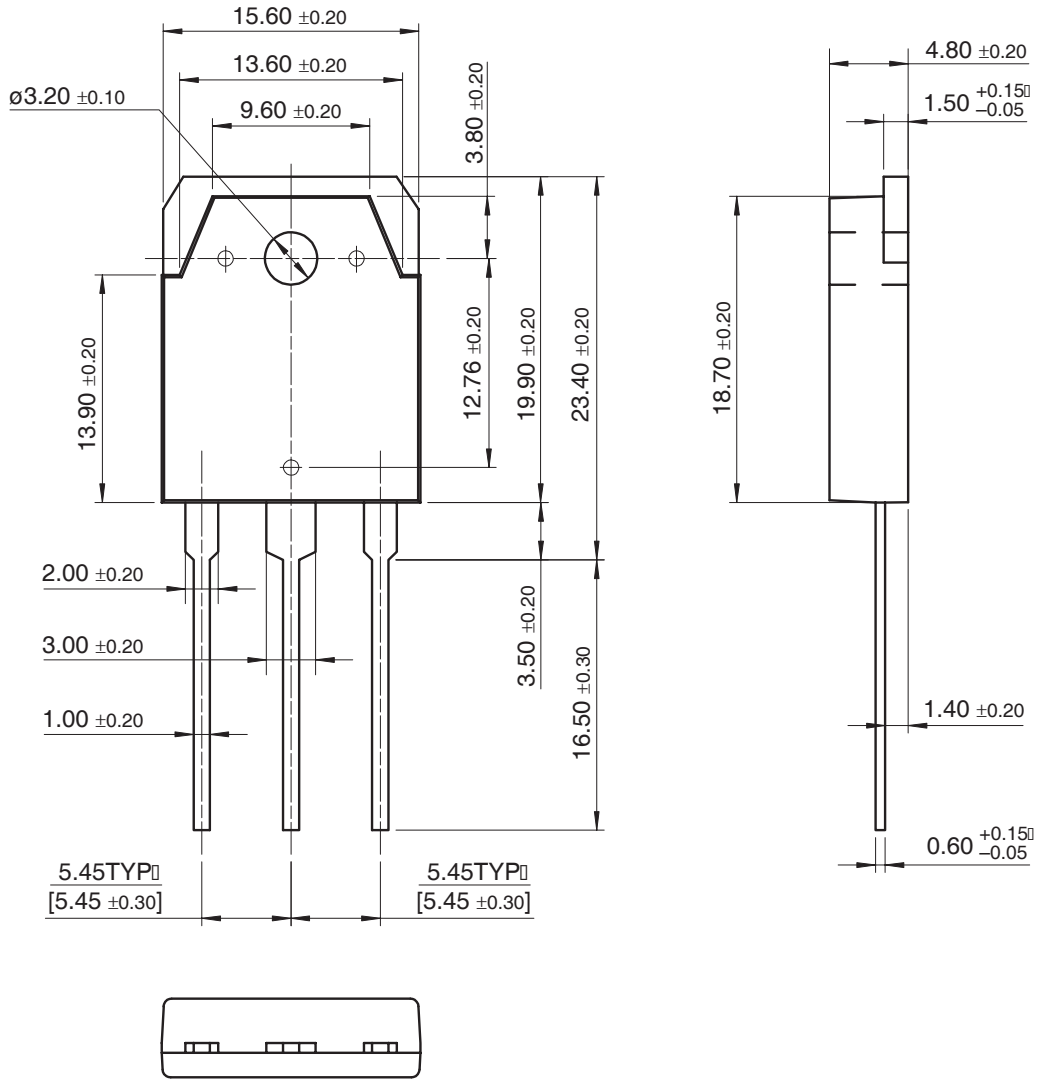


**Figure 21. Typical Reverse Recovery Time**



Mechanical Dimensions

TO-3P





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E <sup>2</sup> C MOS <sup>TM</sup>	i-Lo <sup>TM</sup>	OCX <sup>TM</sup>	RapidConnect <sup>TM</sup>	TruTranslation <sup>TM</sup>
EnSigna <sup>TM</sup>	ImpliedDisconnect <sup>TM</sup>	OCXPro <sup>TM</sup>	mSerDes <sup>TM</sup>	UHC <sup>TM</sup>
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The Power Franchise <sup>®</sup>		POPT <sup>TM</sup>	SPM <sup>TM</sup>	Wire <sup>TM</sup>
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