

General Description

Cmos's Insulated Gate Bipolar Transistors (IGBTs) provides low conduction and switching losses. The device is designed for Motor applications where ruggedness is a required feature.

Features

- High speed switching
- High input impedance
- RoHS Compliant

Product Summary

V _{CES}	I _C
650V	20A

Applications

- Motor drives
- Uninterruptible Power Supply

TO-220F Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{CES}	Collector-Emitter Voltage	650	V
V _{GES}	Gate-Emitter Voltage	±20	V
I _{C@T_C=25°C}	Collector Current	40	A
I _{C@T_C=100°C}		20	A
I _{CM}	Pulsed Collector Current *	60	A
I _{F@T_C=100°C}	Diode Continuous Forward Current	10	A
I _{FM}	Diode Maximum Forward Current	30	A
P _{D@T_C=25°C}	Maximum Power Dissipation	37	W
P _{D@T_C=100°C}	Maximum Junction Temperature	18.5	W
T _{Vj}	Operating Junction temperature range	-40 to 150	°C
T _{stg}	Storage temperature range	-40 to 150	°C

* Repetitive rating : Pulse width limited by max. junction temperature

Thermal Data

Symbol	Parameter	Typ.	Max.	Units
R _{thJA}	Thermal Resistance, Junction-Ambient	---	78	°C/W
R _{thJC}	Thermal Resistance, IGBT Junction-Case	---	3.4	°C/W
R _{thJC}	Thermal Resistance, Diode Junction-Case	---	4.5	°C/W

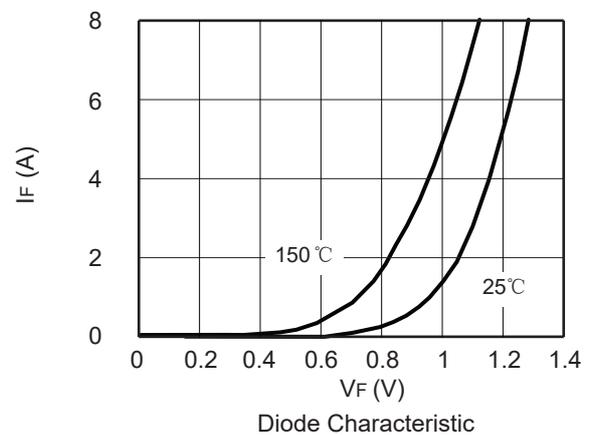
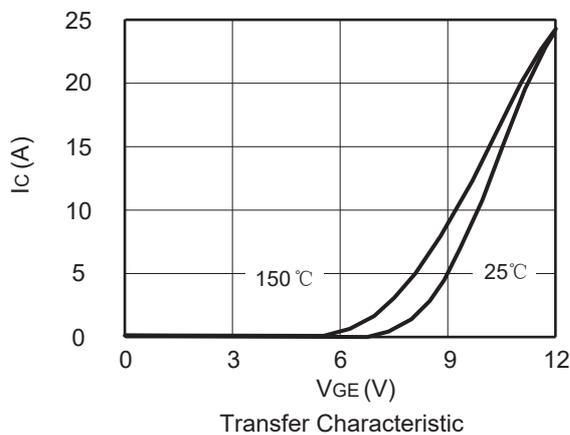
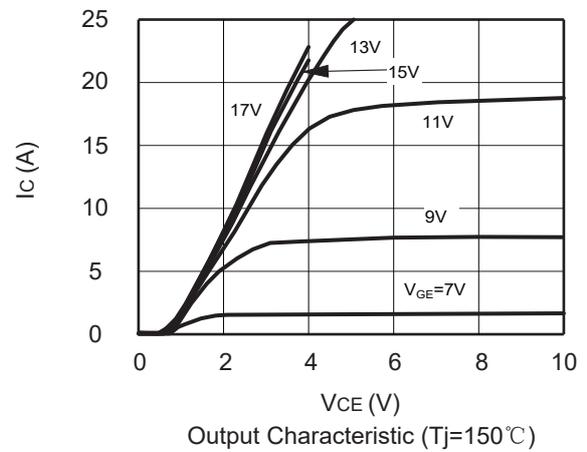
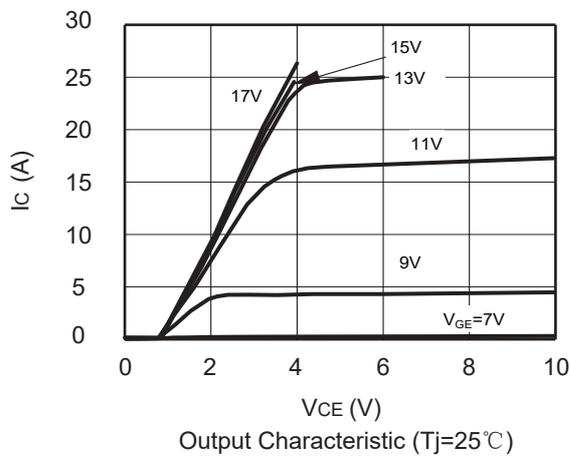
Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Characteristic	Test Condition	Min.	Typ.	Max.	Unit
Static						
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{CE}=0V, I_C=250\mu A$	650	---	---	V
I_{CES}	Collector Cut-off Current	$V_{GE}=0V, V_{CE}=650V, T_{VJ} = 25^{\circ}\text{C}$	---	---	10	μA
I_{GES}	Gate Leakage Current	$V_{CE}=0V, V_{GE}=\pm 20V$	---	---	± 100	nA
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$V_{CE} = V_{GE}, I_C=250\mu A$	4.5	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=20A, T_{VJ} = 25^{\circ}\text{C}$	---	1.8	2.2	V
		$V_{GE}=15V, I_C=20A, T_{VJ} = 150^{\circ}\text{C}$	---	2.1	---	V
Dynamic						
Q_g	Total Gate Charge	$V_{CC}=400V, V_{GE}=15V, I_C= 20A$	---	35	---	nC
Q_{ge}	Gate-Emitter Charge		---	12	---	
Q_{gc}	Gate-Collector Charge		---	19	---	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=400V, I_C=20A, V_{GE}=15V, R_G=10\Omega$ Inductive Load , $T_{VJ} = 25^{\circ}\text{C}$	---	23	---	ns
t_r	Rise Time		---	19	---	
$t_{d(off)}$	Turn-Off Delay Time		---	80	---	
t_f	Fall Time		---	93	---	
E_{on}	Turn-On Switching Loss		---	0.41	---	
E_{off}	Turn-Off Switching Loss	---	0.48	---		
E_{total}	Total Switching Energy	---	0.89	---		
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=1\text{MHz}$	---	1500	---	pF
C_{oes}	Output Capacitance		---	75	---	
C_{res}	Reverse Transfer Capacitance		---	35	---	

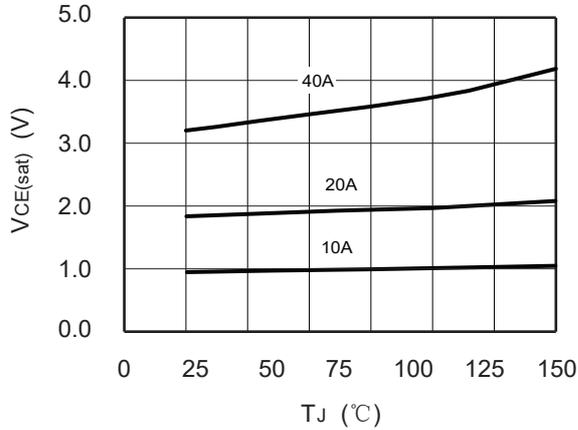
Electrical Characteristic Of Diode

Symbol	Characteristic	Test Condition	Mim.	Typ.	Max.	Unit	
V_F	Diode Forward Voltage	$I_F = 10A$	$T_C=25^\circ C$	---	1.7	---	V
			$T_C=150^\circ C$	---	1.5	---	
t_{rr}	Diode Reverse Recovery Time	$I_F=10A$ $V_R=650V$	$T_C=25^\circ C$	---	112	---	ns
I_{rm}	Diode Peak Reverse Recovery Current		$T_C=25^\circ C$	---	6.4	---	A
Q_{rr}	Diode Reverse Recovery Charge		$T_C=25^\circ C$	---	0.63	---	μC

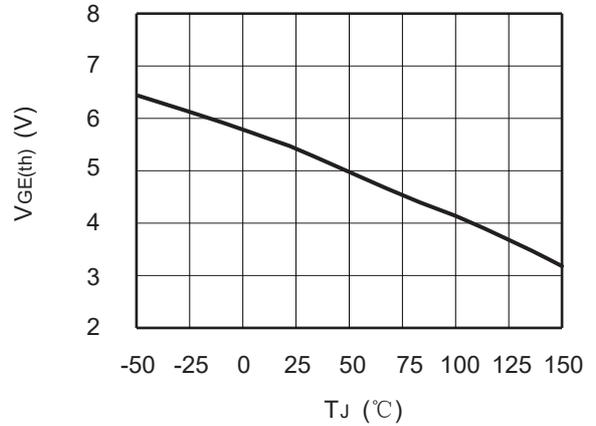
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 Cmos reserves the right to improve product design, functions and reliability without notice. Please refer to the latest version of specification.

Typical electrical and thermal characteris


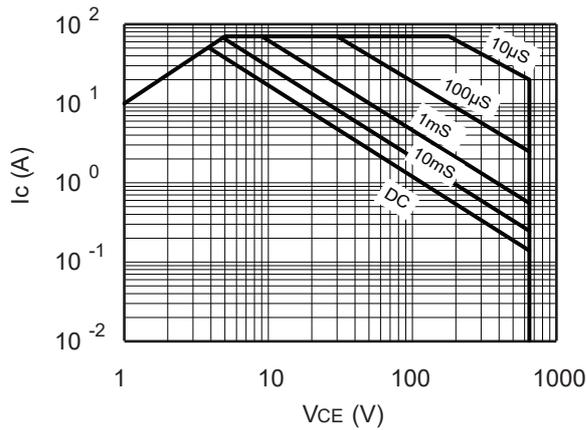
Typical electrical and thermal characteris



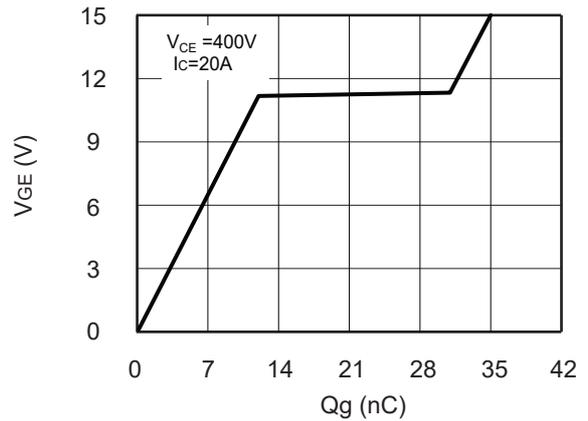
Collector-Emitter Saturation Voltage vs. Junction Temperature



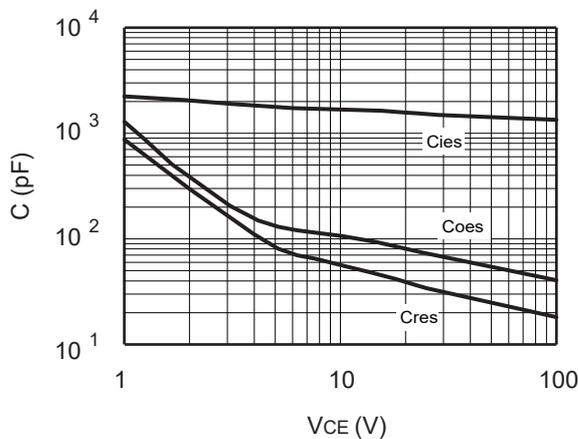
Junction temperature Vs. $V_{GE(th)}$



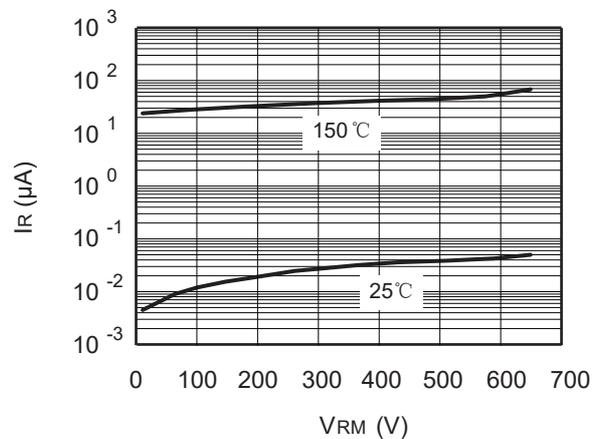
Forward bias safe operating area



Gate-Charge Characteristics



Capacitance Characteristic

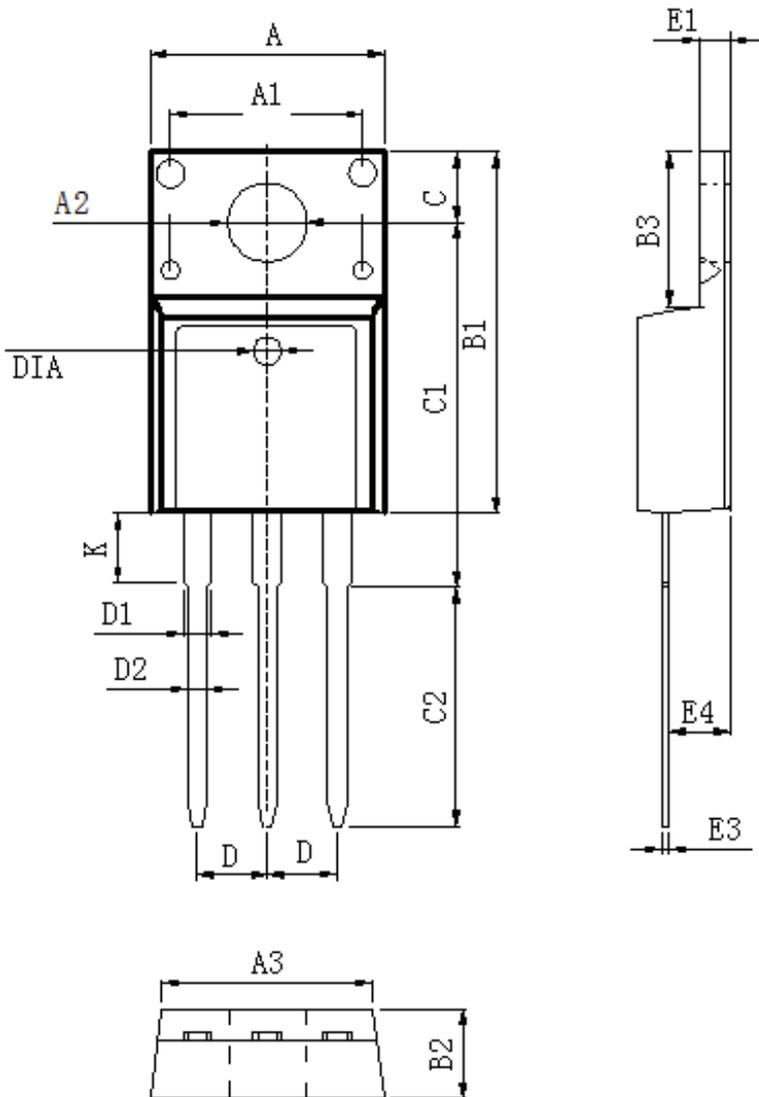


Diode junction temperature Vs. Leakage Current

Package Dimension

TO-220F

Unit :mm



DIM	MILLIMETERS
A	10.16 ± 0.3
A1	7.00 ± 0.1
A2	3.3 ± 0.2
A3	9.5 ± 0.2
B1	15.87 ± 0.3
B2	4.7 ± 0.2
B3	6.68 ± 0.4
C	3.3 ± 0.2
C1	12.57 ± 0.3
C2	10.02 ± 0.5
D	2.54 ± 0.05
D1	1.28 ± 0.2
D2	0.8 ± 0.1
K	3.1 ± 0.3
E1	2.54 ± 0.1
E3	0.5 ± 0.1
E4	2.76 ± 0.2
DIA	$\odot 1.5$ (deep 0.2)