

Product Summary

$V_{(BR)CES}$	$V_{CE(SAT)MAX}$	$I_c(100^{\circ}C)$
600V	1.9V@15V	7A

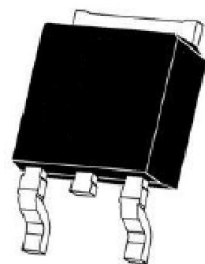
Feature

- Trench FSII Technology Offering
- Very low $V_{CE(sat)}$
- High speed switching
- Positive temperature coefficient in $V_{CE(sat)}$
- Very tight parameter distribution
- High ruggedness, temperature stable behavior

Application

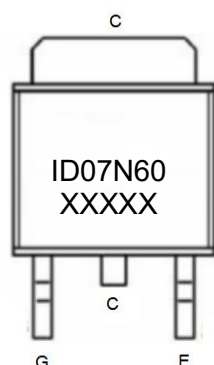
- Air Condition
- Inverters
- Motor drives

Package

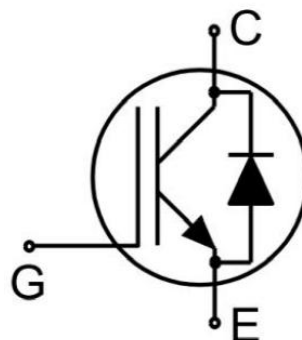


TO-252AB

Marking



Circuit diagram



Absolute maximum ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	600	V
Gate- Emitter Voltage	V_{GES}	± 30	V
Collector Current	I_C	14	A
Collector Current(T _C =100°C)	$I_C(100^\circ\text{C})$	7	A
Pulsed Collector Current, tp limited by Tjmax	I_{Cpuls}	21	A
turn off safe operating area, V _{CE} =600V, T _J =175°C	-	21	A
Diode Continuous Forward Current(T _C =100°C)	$I_F(100^\circ\text{C})$	7	A
Diode Maximum Forward Current	I_{FM}	21	A
Power Dissipation	P_D	87	W
Power Dissipation(T _C =100°C)		43.5	W
Thermal Resistance, Junction to case for Diode	$R_{\theta JC}$	2.50	°C/W
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	1.71	°C/W
Short circuit withstand time V _{GE} =15V, V _{CC} ≤400V, Allowed number of short circuits<1000Time between short circuits:≥1.0s, T _J ≤150°C	t_{sc}	5	us
Maximum Temperature for Soldering	T_L	260	°C
Junction Temperature	T_J	175	°C
Storage Temperature Range	T_{STG}	-55 ~ +175	°C

Electrical characteristics (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE} = 0V, I_{CE} = 1mA$	600			V
Collector-Emitter Leakage Current	I_{CES}	$V_{GE} = 0V, V_{CE} = 600V$			4	μA
Gate to Emitter Leakage Current	I_{GES}	$V_{GE} = \pm 30V, V_{CE} = 0V$			± 200	nA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE} = 15V, I_C = 5A, T_J = 25^\circ\text{C}$		1.7	1.9	V
		$V_{GE} = 15V, I_C = 5A, T_J = 175^\circ\text{C}$		1.9		
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 1mA$	4	5	6	V
Dynamic characteristics						
Input Capacitance	C_{ies}	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		675		pF
Output Capacitance	C_{oes}			22		
Reverse Transfer Capacitance	C_{res}			13		
Total Gate Charge	Q_g	$V_{CC} = 480V, V_{GE} = 15V, I_C = 7A$		28		nC
Gate- Emitter Charge	Q_{ge}			8		
Gate to Collector Charge	Q_{gc}			13		
Short circuit collector current Max.1000 short circuits Time between short circuits: ≥1.0s	$I_{C(SC)}$	$V_{GE} = 15V, V_{CC} \leq 400V, t_{sc} \leq 5us, T_J \leq 150^\circ\text{C}$		34		A
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 400V, V_{GE} = 0/15V, I_C = 7A, R_G = 5\Omega, \text{Inductive Load}$		20		nS
Turn-on rise time	t_r			15		
Turn-off delay time	$t_{d(off)}$			73		
Turn-off fall time	t_f			18		
Turn-On Switching Loss	E_{on}				0.21	mJ
Turn-Off Switching Loss	E_{off}				0.10	
Total Switching Loss	E_{ts}				0.31	
Diode characteristics						
Diode Forward voltage	V_{FM}	$I_F = 7A$			2.4	V
Diode Peak Reverse Recovery Current	I_{RRM}	$I_F = 7A, di/dt = 200A/\mu s$		3.5		A
Reverse Recovery Time	t_{rr}			230		nS
Reverse Recovery Charge	Q_{rr}			0.44		uC

Typical Characteristics

Figure 1 Output Characteristics

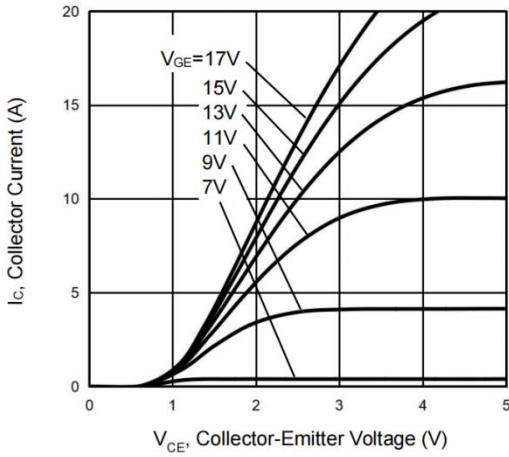


Figure 2 Transfer Characteristics

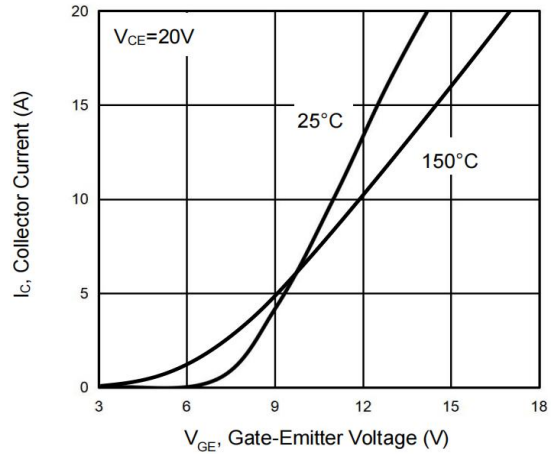


Figure 3 V_{CEsat} vs. Case Temperature

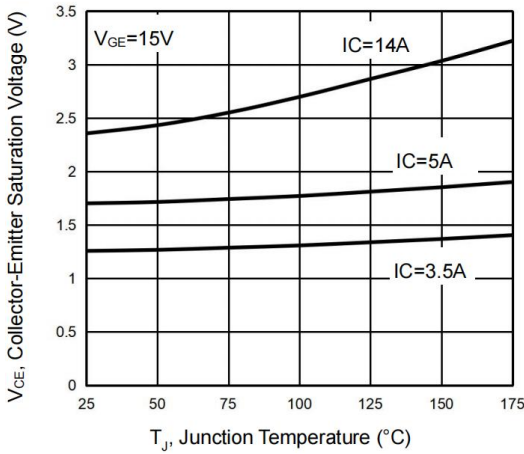


Figure 4 Saturation Voltage vs. V_{GE}

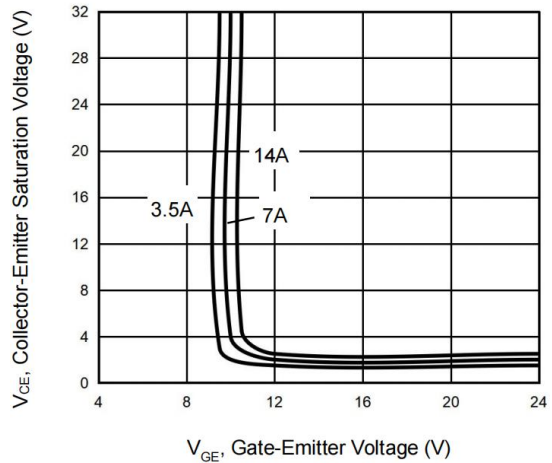


Figure 5 Capacitance Characteristics

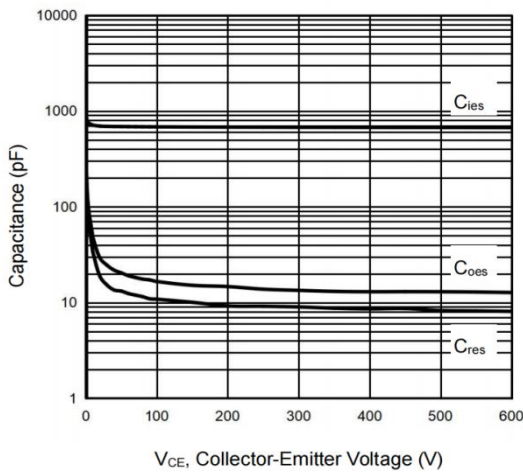
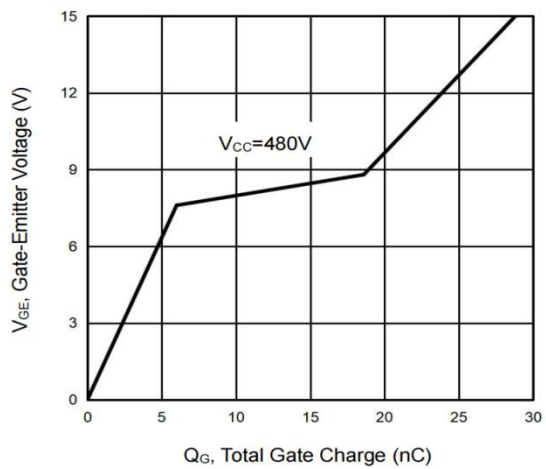


Figure 6 Gate charge waveform



Typical Characteristics

Figure 7 Forward Characteristics

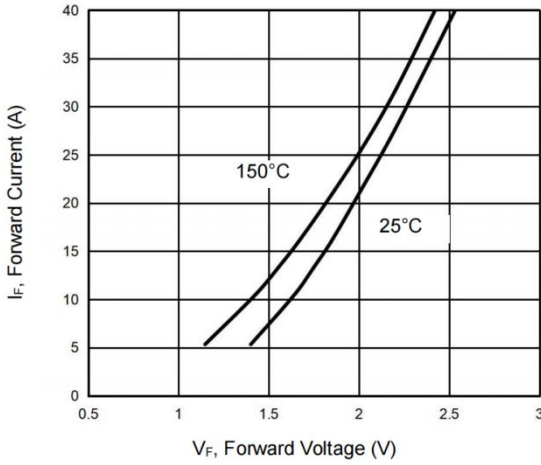


Figure 8 V_F vs. Temperature

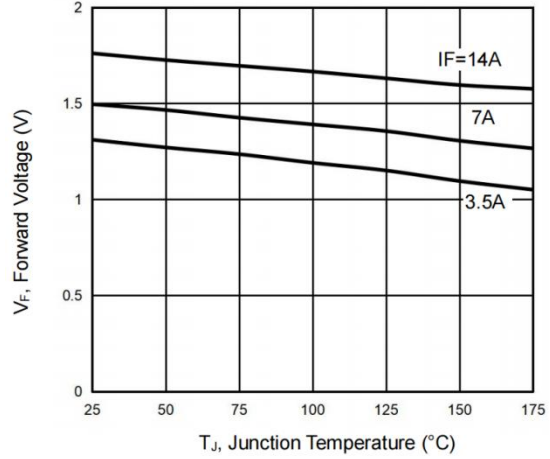


Figure 9 Typical Switching Times as a Function of Gate Resistor

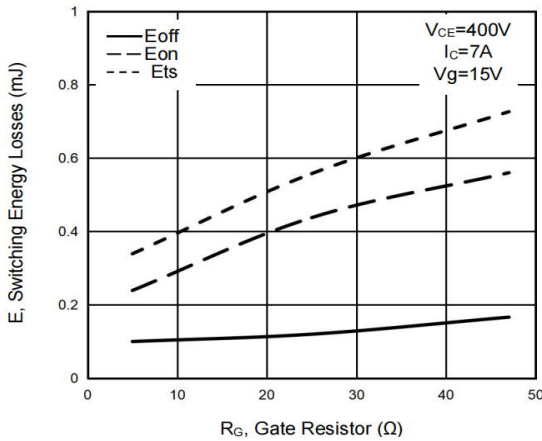


Figure 10 Typical Switching Times as a Function of Junction Temperature

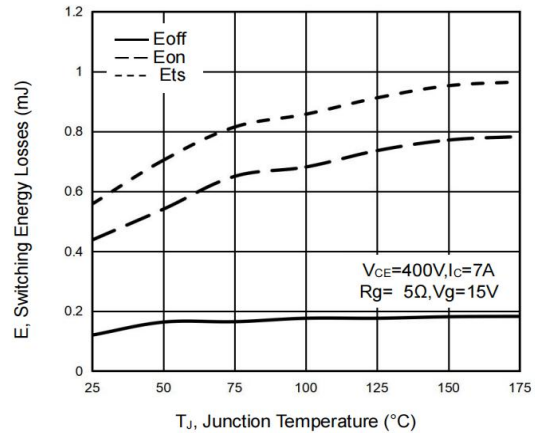


Figure 11 Gate-emitter Threshold Voltage as a Function of Junction Temperature

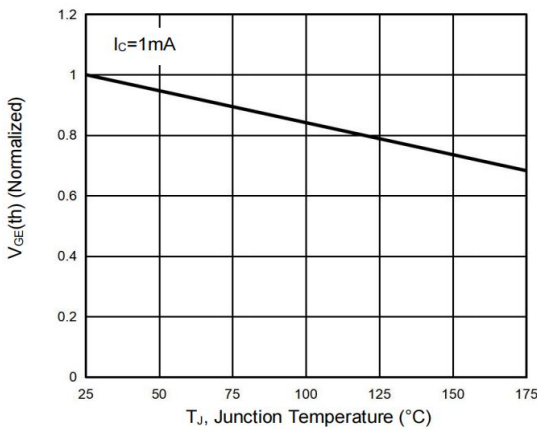
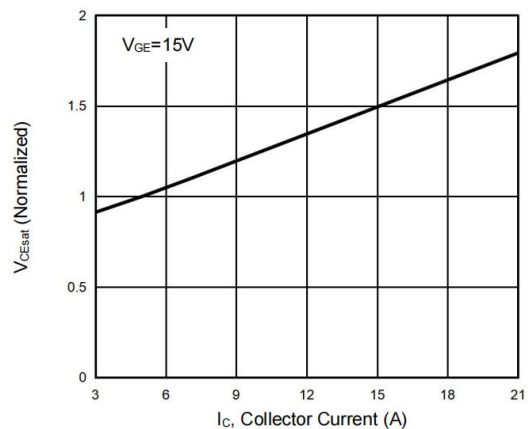
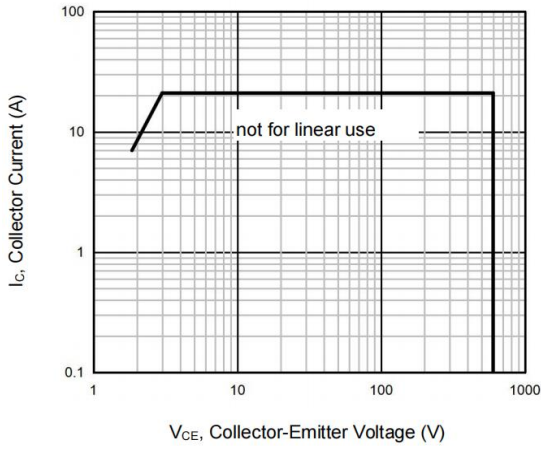


Figure 12 Typical Collector-emitter Saturation Voltage as a function of Collector Current

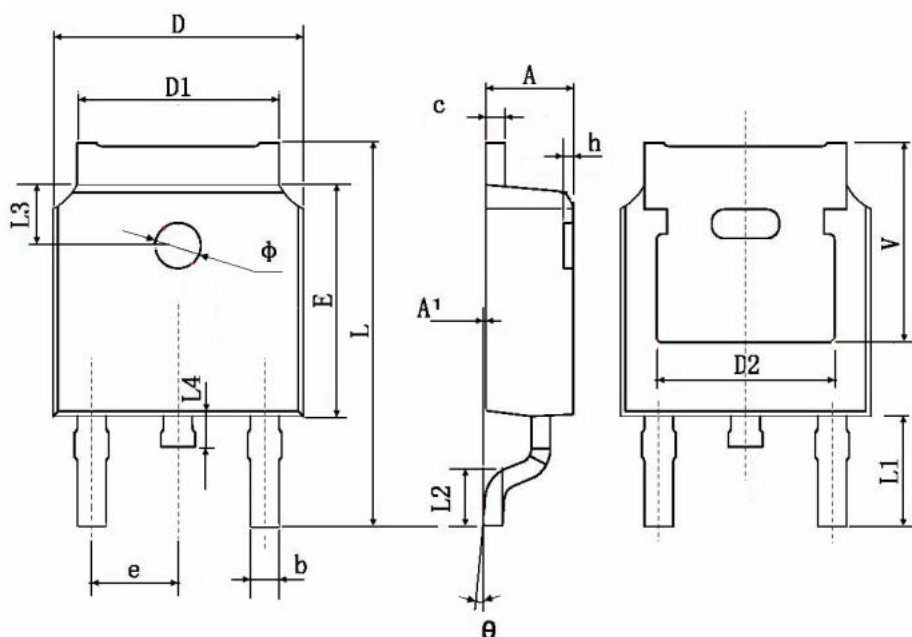


Typical Characteristics

Figure 13 Forward Bias Safe Operating Area



TO-252AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.130	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.600	0.018	0.024
D	6.500	6.700	0.256	0.264
D1	5.100	5.500	0.201	0.217
D2	6.500	6.700	0.256	0.264
E	6.000	6.200	0.236	0.244
e	2.186	2.390	0.086	0.094
L	9.800	10.500	0.386	0.413
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.800	0.055	0.070
L3	1.800 REF.		0.071 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.400	0.043	0.055
θ	0°	8°	0°	8°
V	5.350 TYP		0.211 TYP	