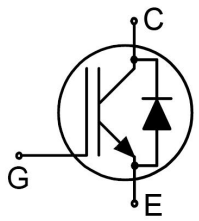
K35A120DS

SETMEKRON

Short circuit withstand time – 10µs
Designed for :
- Frequency Converters
- Uninterrupted Power Supply

Generation for 1200 V applications offers :
- very tight parameter distribution
- high ruggedness, temperature stable behavior

Easy paralleling capability due to positive temperature coefficient in $V_{CE(sat)}$
Low EMI
Low Gate Charge
Very soft, fast recovery anti-parallel EmCon HE diode
Qualified according to JEDEC[1] for target applications
Pb-free lead plating; RoHS compliant



Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1200	V
DC collector current (T_j=150°C)	I_C		A
T_C = 25°C		65	
T_C = 110°C		35	
Pulsed collector current, t_p limited by T_{jmax}	I_{Cpuls}	100	
Turn off safe operating area	-	100	
V_{CE} ≤ 1200V, T_j ≤ 175°C			
Diode forward current (T_j=150°C)	I_F		
T_C = 25°C		60	
T_C = 110°C		35	
Diode pulsed current, t_p limited by T_{jmax}	I_{Fpuls}	100	
Gate-emitter voltage	V_{GE}	±20	V
Short circuit withstand time[2)]	t_{SC}	10	µs
V_{GE} = 15V, V_{CC} ≤ 600V, $T_{j, start}$ ≤ 175°C			
Power dissipation	P_{tot}	360	W
T_C = 25°C			
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-55...+150	
Soldering temperature, 1.6mm (0.063 in.) from case for 10s	-	260	
Wavesoldering only, temperature on leads only			

1) J-STD-020 and JESD-022

2) Allowed number of short circuits: <1000; time between short circuits: >1s.

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.43	K/W
Diode thermal resistance, junction – case	R_{thJCD}		0.81	
Thermal resistance, junction – ambient	R_{thJA}		40	

Electrical Characteristic, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE} =0V, I_C =500µA	1200	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C =35A				
		T_j =25°C	-	1.97	2.1	
		T_j =150°C	-	2.12	-	
		T_j =175°C	-	2.25	-	
Diode forward voltage	V_F	V_{GE} =0V, I_F =35A				
		T_j =25°C	-	1.88	2.1	
		T_j =150°C	-	2.01	-	
		T_j =175°C	-	2.21	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C =1.0mA, V_{CE} = V_{GE}	5.2	5.9	6.5	
Zero gate voltage collector current	I_{CES}	V_{CE} =1200V,				mA
		V_{GE} =0V				
		T_j =25°C	-	-	0.5	
		T_j = 1 5 0 °C	-	-	4.1	
		T_j =175°C			21	
Gate-emitter leakage current	I_{GES}	V_{CE} =0V, V_{GE} =20V	-	-	200	nA
Transconductance	g_{fs}	V_{CE} =20V, I_C =35A	-	19.5	-	S

Dynamic Characteristic

Input capacitance	C_{iss}	V_{CE} =25V,	-	1600	-	pF
Output capacitance	C_{oss}	V_{GE} =0V,	-	155	-	
Reverse transfer capacitance	C_{rss}	f =1MHz	-	90	-	
Gate charge	Q_{Gate}	V_{CC} =960V, I_C =40A V_{GE} =15V	-	120	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	13	-	nH
Short circuit collector current[1)]	$I_{C(SC)}$	V_{GE} =15V, t_{SC} ≤ 10µs V_{CC} = 600V, $T_{j,start}$ = 25°C $T_{j,start}$ = 175°C	-	 150 115	-	A

Switching Characteristic, Inductive Load, at T_j=25 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	T_j =25°C,	-	27	-	ns
Rise time	t_r	V_{CC} =600V, I_C =35A,	-	20	-	
Turn-off delay time	$t_{d(off)}$	V_{GE} =0/15V,	-	265	-	
Fall time	t_f	R_G =16.4Ω ,	-	95	-	
Turn-on energy	E_{on}	L_σ [2)] =105nH,	-	1.55	-	mJ
Turn-off energy	E_{off}	C_σ [2)] =39pF Energy losses include “tail” and diode	-	1.35	-	
Total switching energy	E_{ts}	reverse recovery.	-	2.9	-	
Anti-Parallel Diode Characteristic						
Diode reverse recovery time	t_{rr}	T_j =25°C,	-	195	-	ns
Diode reverse recovery charge	Q_{rr}	V_R =600V, I_F =35A,	-	2.05		µC
Diode peak reverse recovery current	I_{rrm}	di_F/dt=1050A/µs	-	20		A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	475	-	A/µs

[1)] Allowed number of short circuits: <1000; time between short circuits: >1s.
[2)] Leakage inductance L_σ and Stray capacity C_σ due to dynamic test circuit in Figure E.

Switching Characteristic, Inductive Load, at T_j=175 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	T_j =175°C V_{CC} =600V, I_C =35A, V_{GE} =0/15V, R_G = 16.4Ω , L_σ [1)] =175nH, C_σ [1)] =67pF Energy losses include “tail” and diode reverse recovery.	-	25	-	ns
Rise time	t_r		-	24	-	
Turn-off delay time	$t_{d(off)}$		-	340	-	
Fall time	t_f		-	164	-	
Turn-on energy	E_{on}		-	2.25	-	mJ
Turn-off energy	E_{off}		-	2.05	-	
Total switching energy	E_{ts}		-	4.3	-	
Anti-Parallel Diode Characteristic						
Diode reverse recovery time	t_{rr}	T_j =175°C V_R =600V, I_F =35A, di_F/dt=1000A/µs	-	290	-	ns
Diode reverse recovery charge	Q_{rr}		-	3.65	-	µC
Diode peak reverse recovery current	I_{rrm}		-	24	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	330		A/µs

[1)] Leakage inductance L_σ and Stray capacity C_σ due to dynamic test circuit in Figure E.

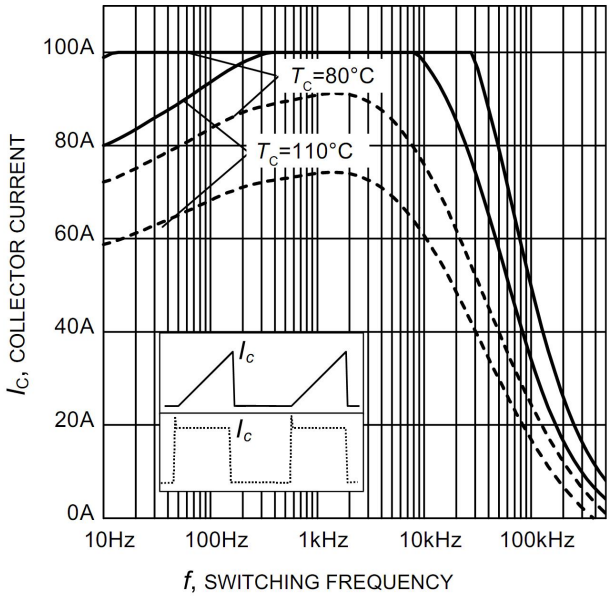


Figure 1. Collector current as a function of switching frequency
($T_j \leq 175°C$, $D = 0.5$, $V_{CE} = 600V$, $V_{GE} = 0/+15V$, $R_G = 12\Omega$)

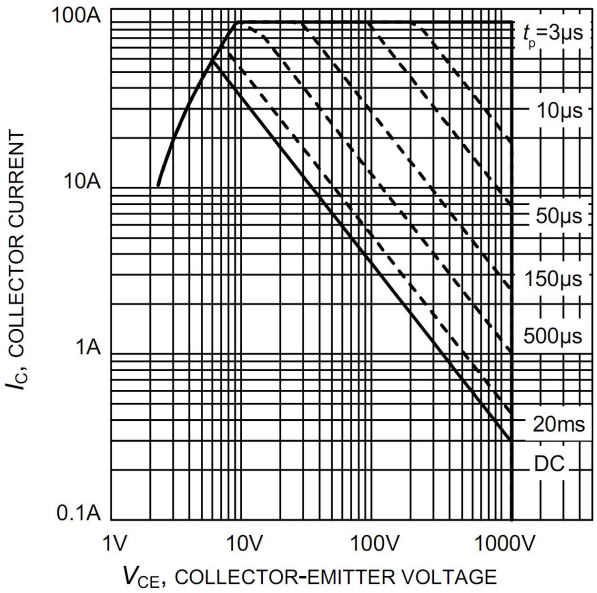


Figure 2. Safe operating area
($D = 0$, $T_C = 25°C$, $T_j \leq 175°C$; V_{GE}=15V)

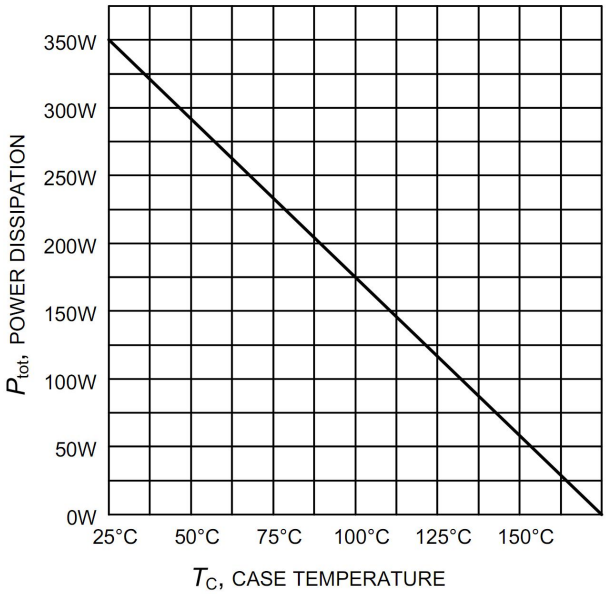


Figure 3. Maximum power dissipation as a function of case temperature
($T_j \leq 175°C$)

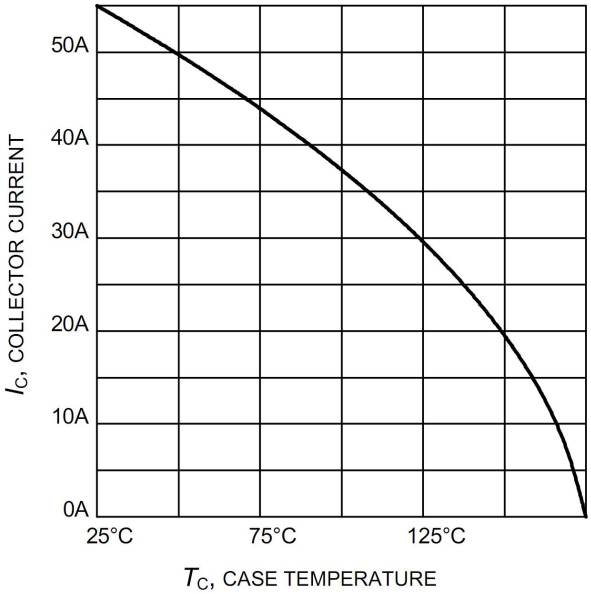


Figure 4. Maximum collector current as a function of case temperature
($V_{GE} \geq 15V$, $T_j \leq 175°C$)

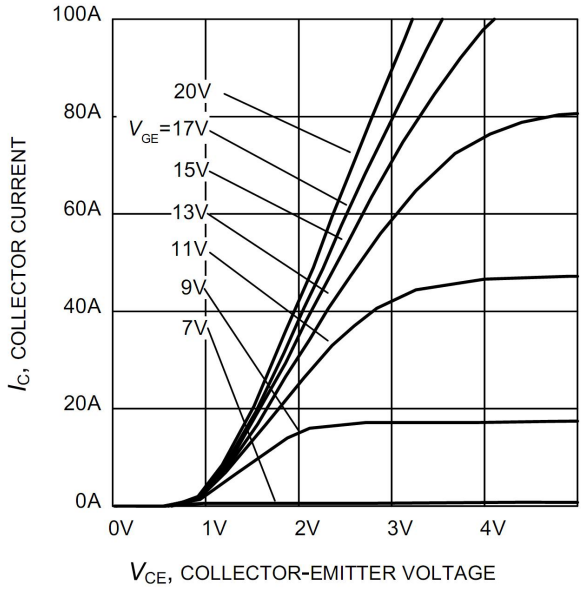


Figure 5. Typical output characteristic
(T_j = 25°C)

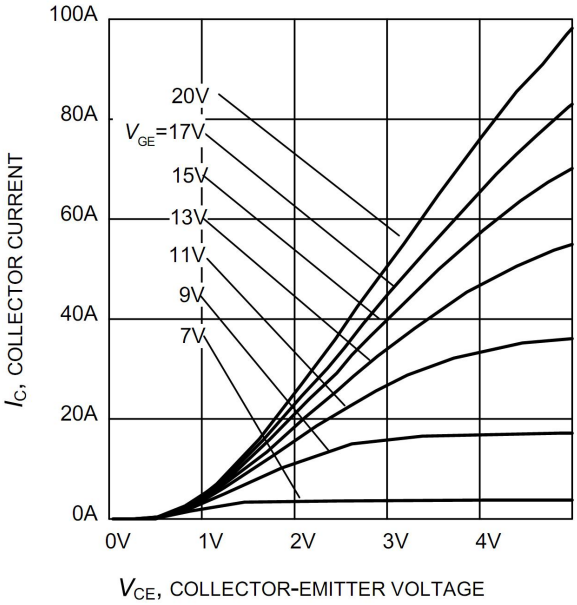


Figure 6. Typical output characteristic
(T_j = 175°C)

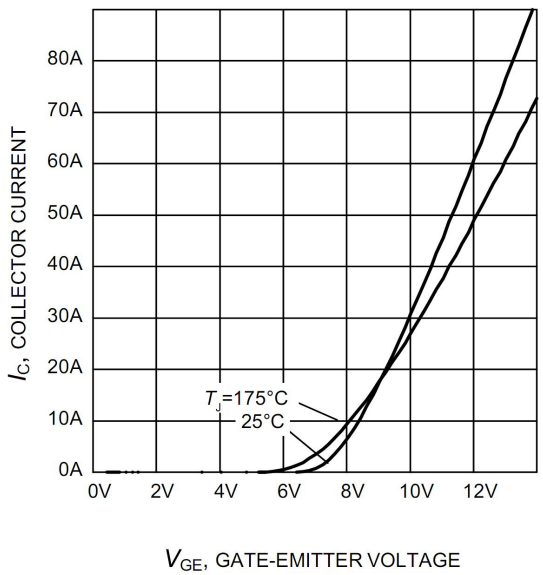


Figure 7. Typical transfer characteristic
(V_{CE}=20V)

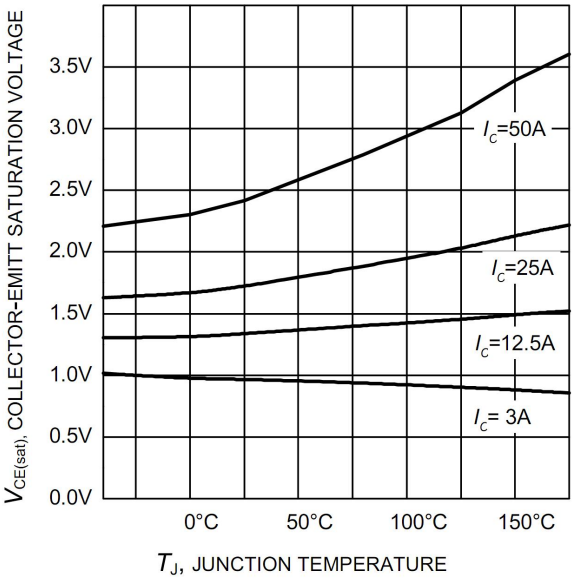


Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
(V_{GE} = 15V)

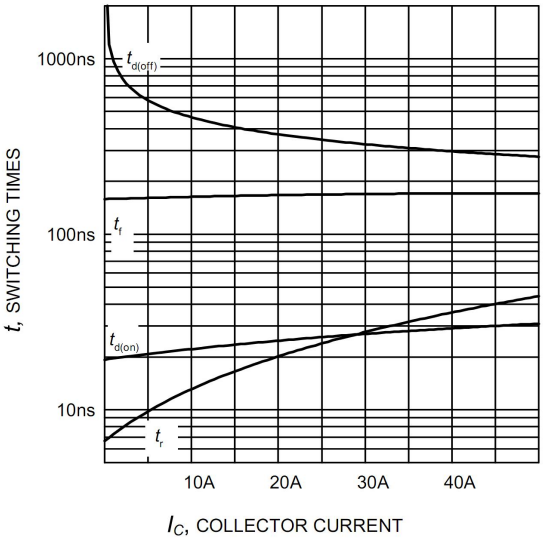


Figure 9. Typical switching times as a function of collector current (inductive load, T_J=175°C, V_{CE}=600V, V_{GE}=0/15V, R_G=16.4Ω, Dynamic test circuit in Figure E)

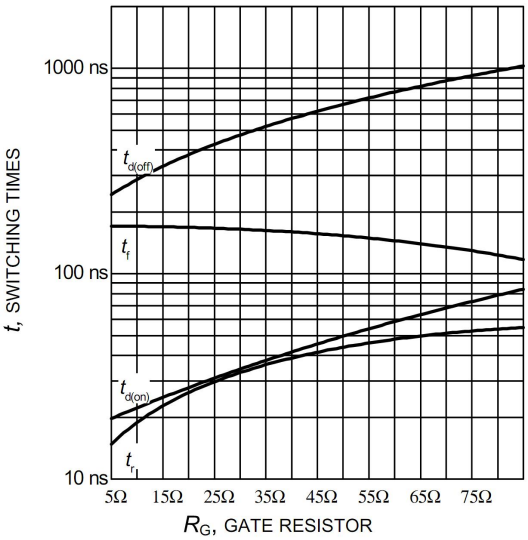


Figure 10. Typical switching times as a function of gate resistor (inductive load, T_J=175°C, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, Dynamic test circuit in Figure E)

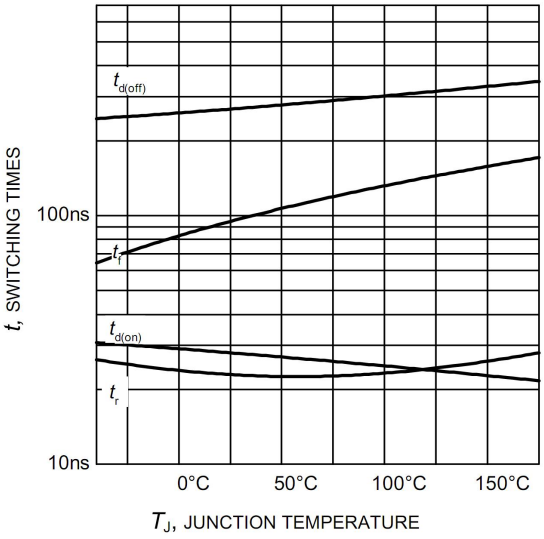


Figure 11. Typical switching times as a function of junction temperature (inductive load, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, R_G=16.4Ω, Dynamic test circuit in Figure E)

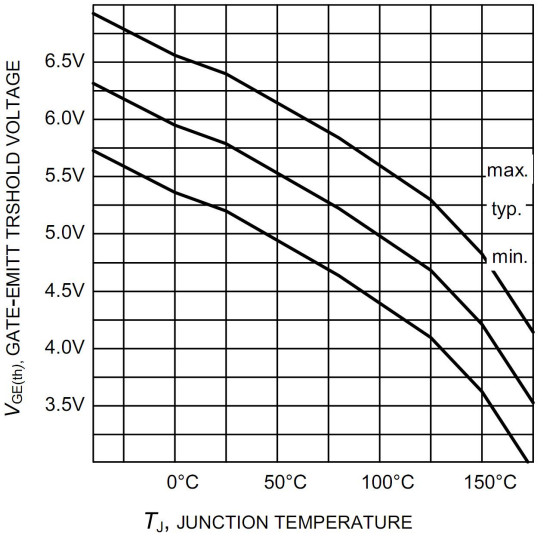
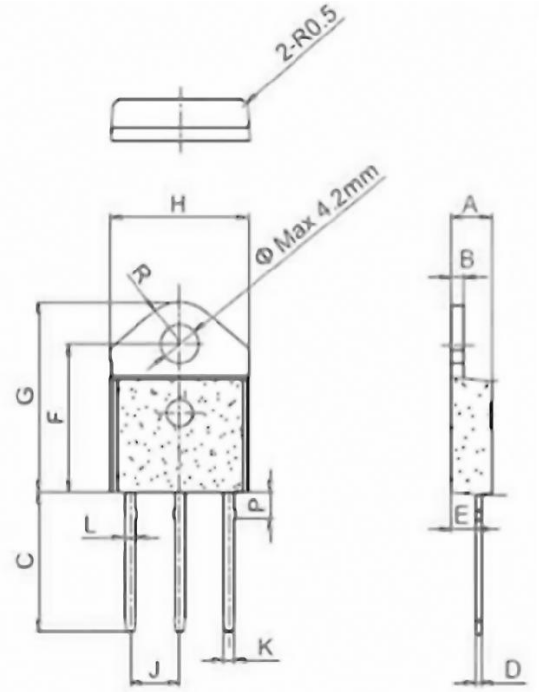


Figure 12. Gate-emitter threshold voltage as a function of junction temperature (I_C = 1.0mA)

Package: TO-3P



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	1.45		1.55	0.057		0.061
C	14.35		15.60	0.565		0.614
D	0.50		0.70	0.020		0.028
E	2.70		2.90	0.106		0.114
F	15.80		16.50	0.622		0.650
G	20.40		21.10	0.803		0.831
H	15.10		15.50	0.594		0.610
J	5.40		5.65	0.213		0.222
K	1.10		1.40	0.043		0.055
L	1.35		1.50	0.053		0.059
P	2.80		3.00	0.110		0.118
R		4.35			0.171	