

MSAGZ52F120A
MSAHZ52F120A

Features

- Rugged polysilicon gate cell structure
- high current handling capability, latch-proof
- Hermetically sealed, surface mount power package
- Low package inductance
- Very low thermal resistance
- Reverse polarity available upon request: MSAH(G)Z52F120B
- high frequency IGBT, low switching losses
- anti-parallel FREDiode (MSAHZ52F120A only)

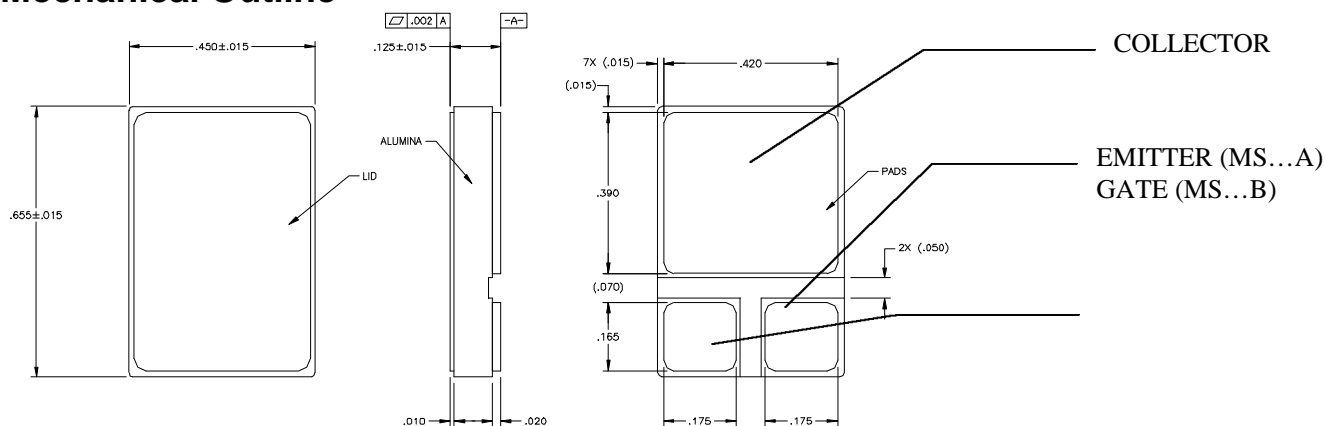
1200 Volts
52 Amps
3.2 Volts vce(sat)

N-CHANNEL
INSULATED GATE
BIPOLAR TRANSISTOR

Maximum Ratings @ 25°C (unless otherwise specified)

DESCRIPTION		SYMBOL	MAX.	UNIT
Collector-to-Emitter Breakdown Voltage (Gate Shorted to Emitter) @ $T_J \geq 25^\circ\text{C}$		BV_{CES}	1200	Volts
Collector-to-Gate Breakdown Voltage @ $T_J \geq 25^\circ\text{C}$, $R_{GS} = 1\text{ M}\Omega$		BV_{CGR}	1200	Volts
Continuous Gate-to-Emitter Voltage		V_{GES}	+/-20	Volts
Transient Gate-to-Emitter Voltage		V_{GEM}	+/-30	Volts
Continuous Collector Current	$T_J = 25^\circ\text{C}$ $T_J = 90^\circ\text{C}$	I_{C25} I_{C90}	52 33	Amps
Peak Collector Current (pulse width limited by T_{Jmax1})	$T_J = 25^\circ\text{C}$ $T_J = 90^\circ\text{C}$	$I_{CM(25)}$ $I_{CM(90)}$	104 66	Amps
Avalanche energy (single pulse) @ $I_C = 25\text{A}$, $V_{CC} = 50\text{V}$, $L = 200\mu\text{H}$, $R_G = 25\Omega$, $T_J = 25^\circ\text{C}$		E_{AS}	65	mJ
Short circuit current (SOA) , $V_{CE} \leq 1200\text{V}$, $T_J = 150^\circ\text{C}$, $t_{sc} \leq 10\mu\text{s}$		$I_{C(sc)}$	260	A
Short circuit (reverse) current (RBSOA) , $V_{CE} \leq 1200\text{V}$, $T_J = 150^\circ\text{C}$		$I_{C(sc)RBSOA}$	66	A
Power Dissipation		P_D	300	Watts
Junction Temperature Range		T_J	-55 to +150	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55 to +150	$^\circ\text{C}$
Continuous Source Current (Body Diode, MSAHZ52F120A only)		I_S	50	Amps
Pulse Source Current (Body Diode, MSAHZ52F120A only)		I_{SM}	100	Amps

Mechanical Outline



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Electrical Parameters @ 25°C (unless otherwise specified)

DESCRIPTION	SYMBOL	CONDITIONS	MIN	TYP.	MAX	UNIT	
Collector-to-Emitter Breakdown Voltage (Gate Shorted to Emitter)	BV_{CES}	$V_{GS} = 0\text{ V}, I_C = 250\ \mu\text{A}$	1200			V	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 350\ \mu\text{A}$	4.5	5.5	6.5	V	
Gate-to-Emitter Leakage Current	I_{GES}	$V_{GE} = \pm 20V_{DC}, V_{CE} = 0$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			± 100 ± 200	nA	
Collector-to-Emitter Leakage Current (Zero Gate Voltage Collector Current)	I_{CES}	$V_{CE} = 0.8 \cdot BV_{CES}$ $V_{GE} = 0\text{ V}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			250 1000	μA	
Collector-to-Emitter Saturation Voltage (1)	$V_{CE(sat)}$	$V_{GE} = 15\text{ V}, I_C = 25\text{ A}$ $I_C = 25\text{ A}$ $I_C = 60\text{ A}$ $I_C = 30\text{ A}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		2.7 3.3 3.4 4.3	3.2 3.9	V	
Forward Transconductance (1)	g_{fs}	$V_{CE} = 20\text{ V}; I_C = 25\text{ A}$	8.5	20		S	
Input Capacitance	C_{ies}	$V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1\text{ MHz}$		1650	2200	pF	
Output Capacitance	C_{oes}			250	380		
Reverse Transfer Capacitance	C_{res}			110	160		
INDUCTIVE LOAD, $T_J = 125^\circ\text{C}$							
Turn-on Delay Time	$t_{d(on)}$	$V_{GE} = 15\text{ V}, V_{CE} = 600\text{ V},$ $I_C = 25\text{ A}, R_G = 47\ \Omega,$ $L = 100\ \mu\text{H}$ note 2, 3		75	110	ns	
Rise Time	t_{ri}			65	100	ns	
On Energy	E_{on}				3.6	mJ	
Turn-off Delay Time	$t_{d(off)}$				420	560	ns
Fall Time	t_{fi}				45	60	ns
Off Energy	E_{off}				2.4		mJ
INDUCTIVE LOAD, $T_J = 125^\circ\text{C}$							
Turn-on Delay Time	$t_{d(on)}$	$V_{GE} = 15\text{ V}, V_{CE} = 600\text{ V},$ $I_C = 50\text{ A}, R_G = 47\ \Omega,$ $L = 100\ \mu\text{H}$ note 2, 3		95		ns	
Rise Time	t_{ri}			90		ns	
On Energy	E_{on}			10		mJ	
Turn-off Delay Time	$t_{d(off)}$			420		ns	
Fall Time	t_{fi}			45		ns	
Off Energy	E_{off}			4.2		mJ	
Total Gate Charge	Q_g	$V_{GE} = 15\text{ V}, V_{CE} = 600\text{ V}, I_C = 25\text{ A}$		160		nC	
Gate-to-Emitter Charge	Q_{ge}			20			
Gate-to-Collector (Miller) Charge	Q_{gc}			75			
Antiparallel diode forward voltage (MSAHZ52F120A only)	V_F	$I_E = 10\text{ A}$ $I_E = 10\text{ A}$ $T_J = 25^\circ\text{C}$ $T_J = 100^\circ\text{C}$		2.4 2	3	V V	
Antiparallel diode reverse recovery time (MSAHZ52F120A only)	t_{rr}	$I_E = 10\text{ A}, dI_E/dt = 100\text{ A/us}, T_J = 25^\circ\text{C}$ $I_E = 10\text{ A}, dI_E/dt = 800\text{ A/us}, T_J = 125^\circ\text{C}$		60	TBD	ns ns	
Antiparallel diode reverse recovery charge (MSAHZ52F120A only)	Q_{rr}	$I_E = 10\text{ A}, dI_E/dt = 100\text{ A/us}, T_J = 25^\circ\text{C}$ $I_E = 10\text{ A}, dI_E/dt = 800\text{ A/us}, T_J = 125^\circ\text{C}$		800	TBD	nC nC	
Antiparallel diode peak recovery current (MSAHZ52F120A only)	I_{RM}	$I_E = 10\text{ A}, dI_E/dt = 100\text{ A/us}, T_J = 25^\circ\text{C}$ $I_E = 10\text{ A}, dI_E/dt = 800\text{ A/us}, T_J = 125^\circ\text{C}$		22	TBD	A A	

Notes

- (1) Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\delta \leq 2\%$
- (2) switching times and losses may increase for larger V_{CE} and/or R_G values or higher junction temperatures.
- (3) switching losses include "tail" losses
- (4) Microsemi Corp. does not manufacture the igbt die; contact company for details.