

MBM400E25E

Silicon N-channel IGBT

FEATURES

- * High speed, low loss IGBT module.
- * Low driving power due to low input capacitance MOS gate.
- * Low noise due to ultra soft fast recovery diode.
- * High reliability, high durability module.
- * High thermal fatigue durability.
($\Delta T_c=70K$, $N>30,000$ cycles)
- * Isolated heat sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$)

Item	Symbol	Unit	MBM400E25E
Collector Emitter Voltage	V_{CES}	V	2,500
Gate Emitter Voltage	V_{GES}	V	± 20
Collector Current	DC	I_C	400 ($T_c=100^\circ\text{C}$)
	1ms	I_{Cp}	800
Forward Current	DC	I_F	400
	1ms	I_{FM}	800
Junction Temperature	T_j	$^\circ\text{C}$	-40 ~ +150
Storage Temperature	T_{stg}	$^\circ\text{C}$	-40 ~ +125
Isolation Voltage	V_{ISO}	V_{RMS}	4,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/15 (1)
	Mounting (M6)	-	6 (2)

Notes: (1) Recommended Value $1.8\pm 0.2/9\pm 1\text{N}\cdot\text{m}$ (2) Recommended Value $5.5\pm 0.5\text{N}\cdot\text{m}$

ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector Emitter Cut-Off Current	I_{CES}	mA	-	-	4	$V_{CE}=2,500\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$	
			-	7	20	$V_{CE}=2,500\text{V}$, $V_{GE}=0\text{V}$, $T_j=138^\circ\text{C}$	
Gate Emitter Leakage Current	I_{GES}	nA	-500	-	+500	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_j=25^\circ\text{C}$	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	V	1.6	2.3	3.0	$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_j=138^\circ\text{C}$ (chip level)	
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V	4.5	6.0	7.5	$V_{CE}=15\text{V}$, $I_C=40\text{mA}$, $T_j=25^\circ\text{C}$	
Input Capacitance	C_{ies}	nF	-	67	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$	
Internal Gate Resistance	R_{ge}	Ω	-	4.8	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$	
Switching Times	Rise Time	t_r	μs	0.9	1.5	2.1	$V_{CC}=1,300\text{V}$, $I_C=150\text{A}$ $L=120\text{nH}$ $R_G(\text{ON/OFF})=15/4.7\Omega$ (3) $V_{GE}=\pm 14.7\text{V}$, $T_j=138^\circ\text{C}$
	Turn On Time	t_{on}		2.0	2.6	3.2	
	Fall Time	t_f		0.8	1.4	2.0	
	Turn Off Time	t_{off}		2.8	3.8	4.8	
Peak Forward Voltage Drop	V_{FM}	V	1.8	2.2	2.8	$I_F=400\text{A}$, $V_{GE}=0\text{V}$, $T_j=138^\circ\text{C}$ (chip level)	
Reverse Recovery Time	t_{rr}	μs	0.3	0.6	0.9	$V_{CC}=1,300\text{V}$, $I_F=150\text{A}$, $L=120\text{nH}$ $T_j=138^\circ\text{C}$	
Turn On Loss	$E_{on(10\%)}$	J/P	-	0.25	0.28	$V_{CC}=1,300\text{V}$, $I_C=I_F=150\text{A}$, $L=110\text{nH}$	
Turn Off Loss	$E_{off(10\%)}$	J/P	-	0.23	0.30	$R_G(\text{ON/OFF})=15/4.7\Omega$ (3)	
Reverse Recovery Loss	$E_{rr(10\%)}$	J/P	-	0.15	0.19	$V_{GE}=\pm 14.7\text{V}$, $T_j=138^\circ\text{C}$	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.0255	Junction to case (par arm)
	FWD	$R_{th(j-c)}$		-	-	0.051	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.018	-	Case to fin ($\lambda_{grease}=1\text{W}/(\text{m}\cdot\text{K})$, heat-sink flatness $\leq 50\mu\text{m}$)

Notes:(3) R_G value is the test condition's value for evaluation of the switching times, not recommended value.Please, determine the suitable R_G value after the measurement of switching waveforms

(overshoot voltage, etc.) with appliance mounted.

* Please contact our representatives at order.

* For improvement, specifications are subject to change without notice.

* For actual application, please confirm this spec sheet is the newest revision.

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MODULE MECHANICAL CHARACTERISTICS

Item	Unit	Characteristics.	Conditions
Weight	g	900	
Comparative Tracking Index (CTI)		600	
Module Base plate Material		Al-Si-C	
Baseplate Thickness	mm	5	
Insulation Plate Material		AlN	
Terminal Surface Treatment		Ni Plating	
Case Material		Poly-Phenilene Sulfide	

DEFINITION OF TEST CIRCUIT

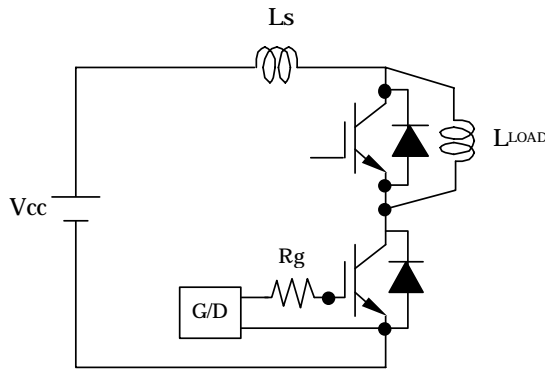


Fig.1 Switching test circuit

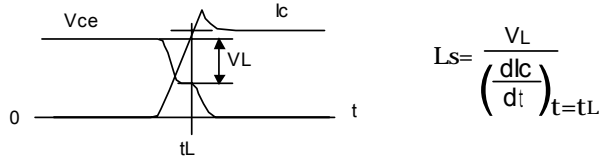


Fig.2 Definition of Ls

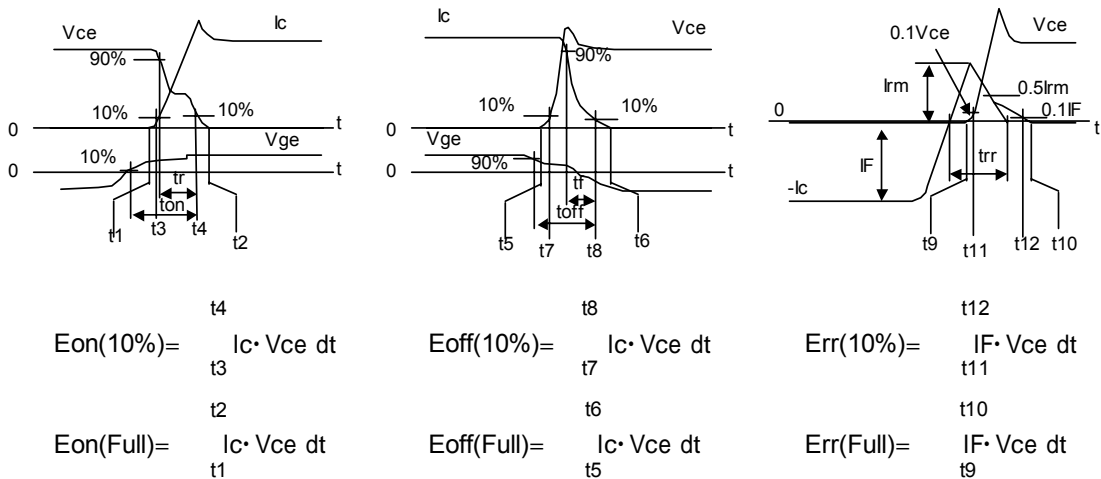
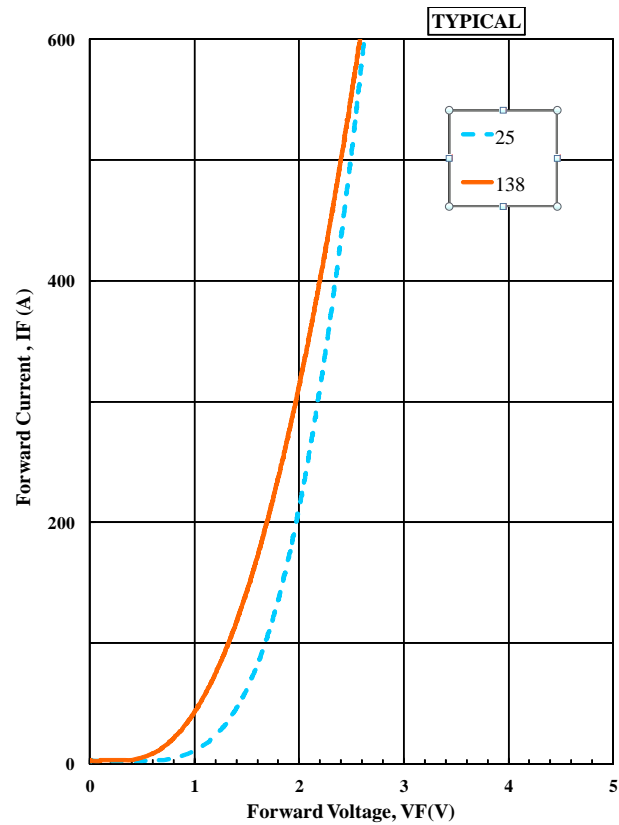
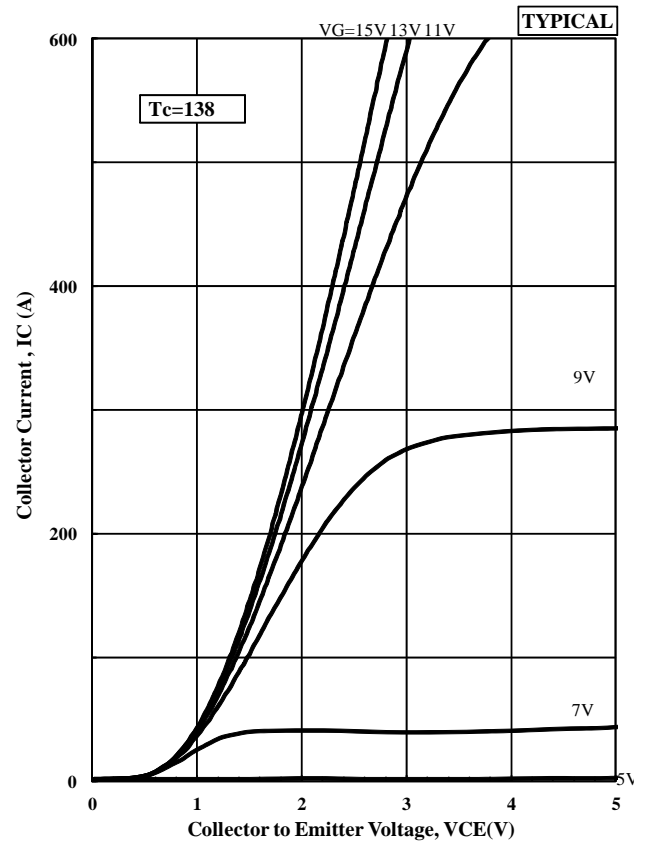
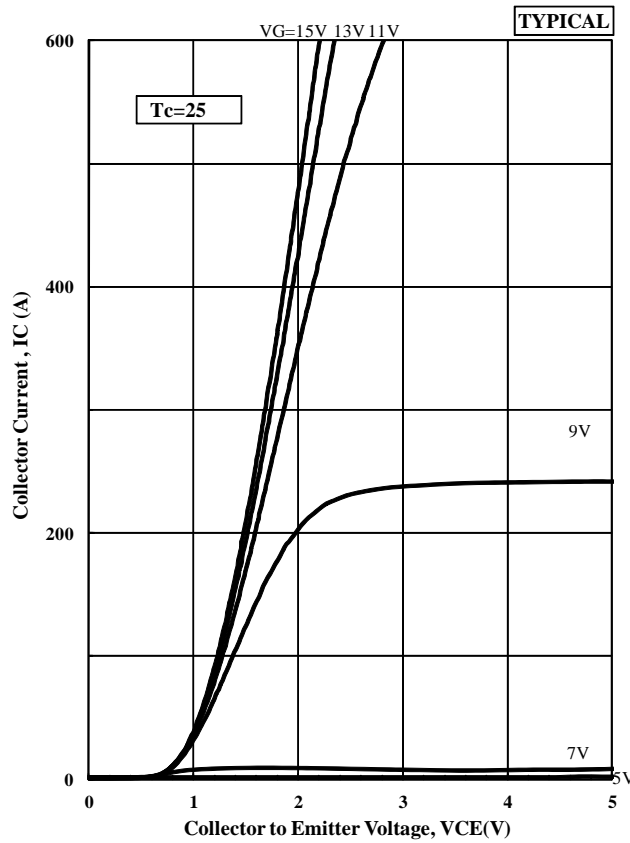


Fig.3 Definition of switching loss

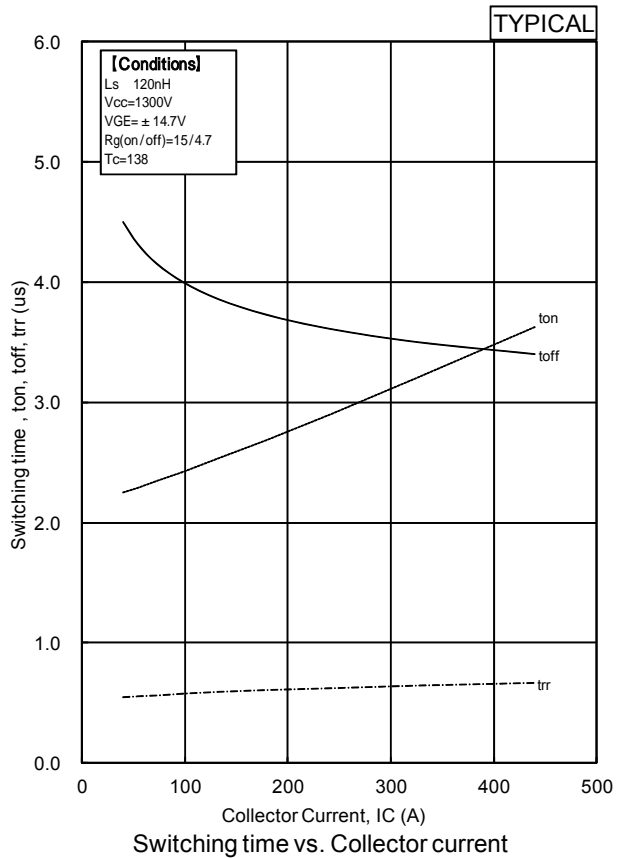
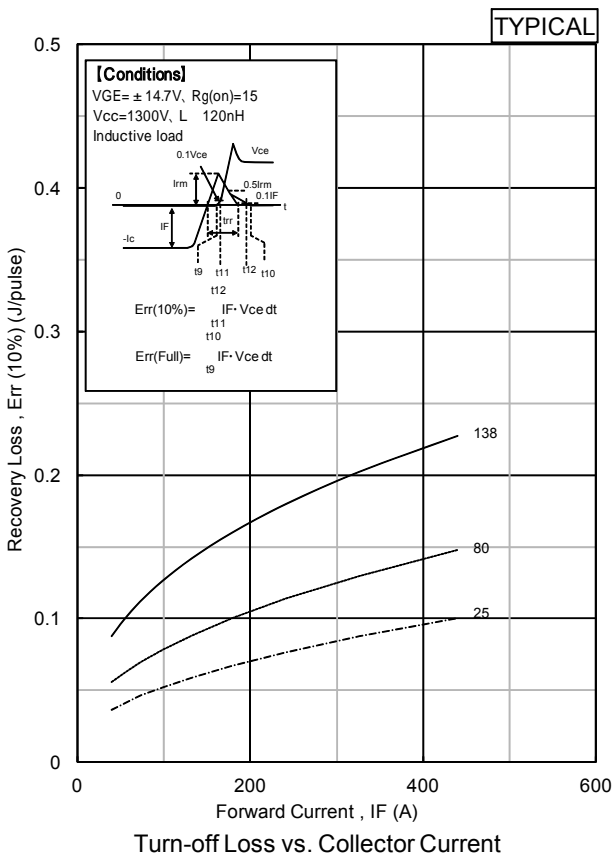
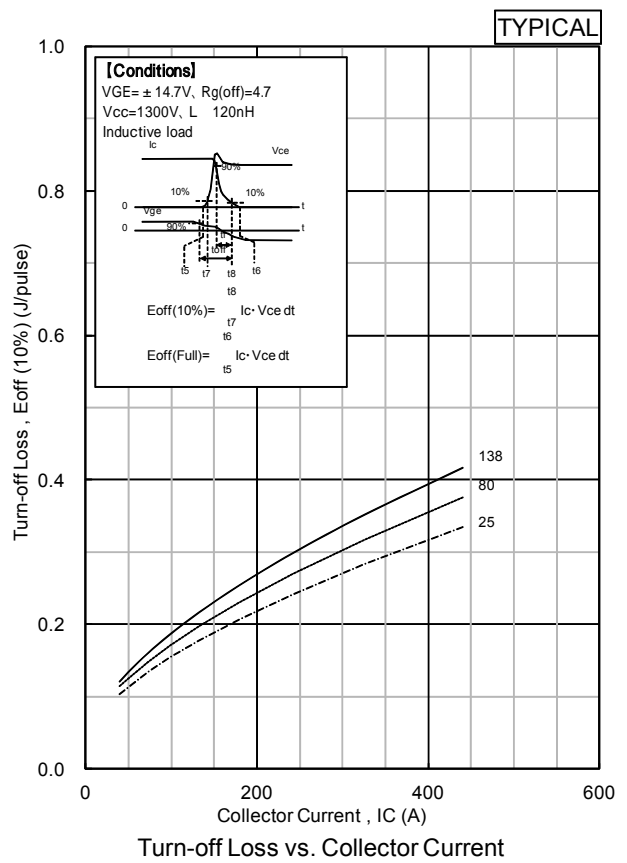
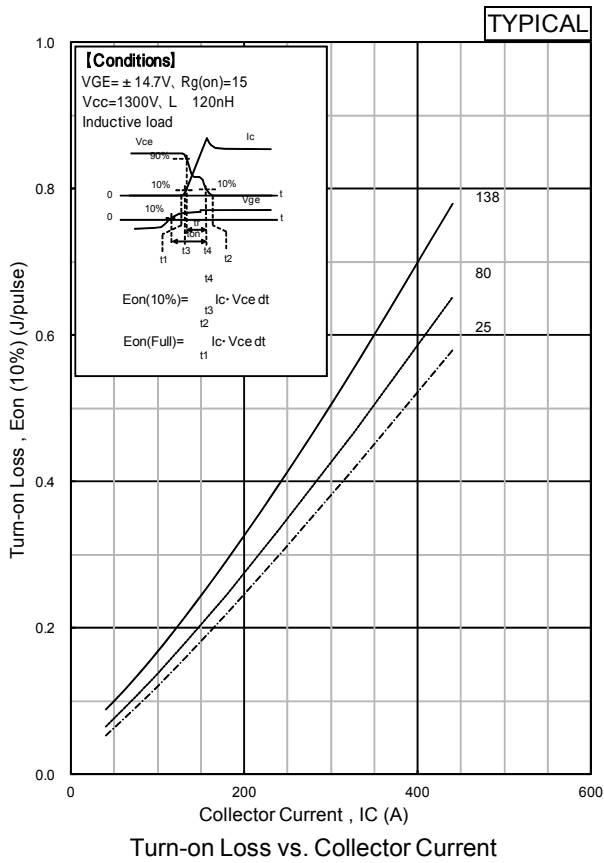
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STATIC CHARACTERISTICS



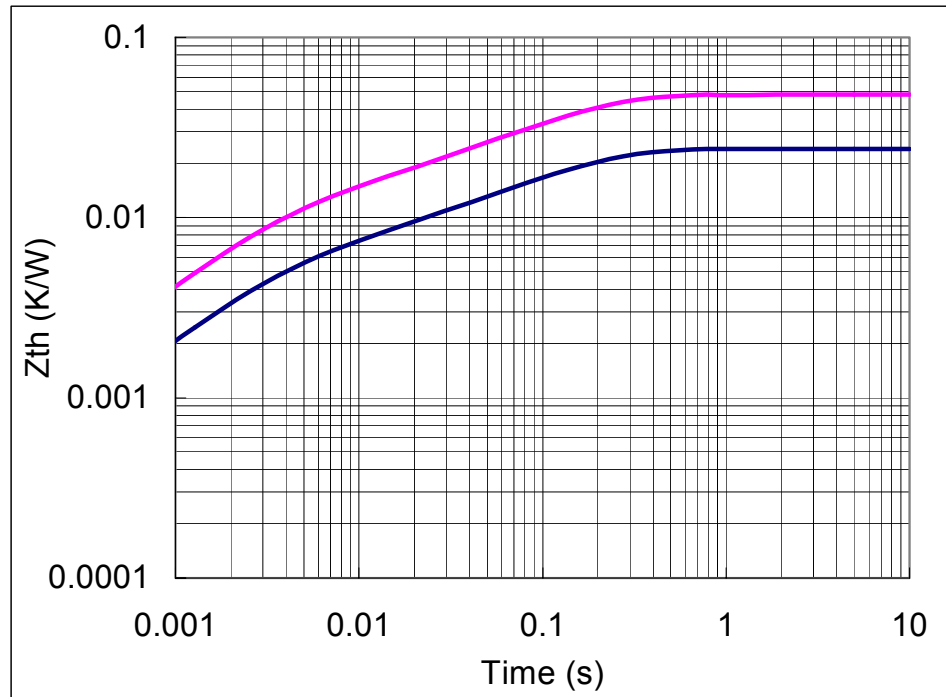
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DYNAMIC CHARACTERISTICS



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TRANSIENT THERMAL IMPEDANCE



Diode
IGBT

Transient Thermal Impedance Curve

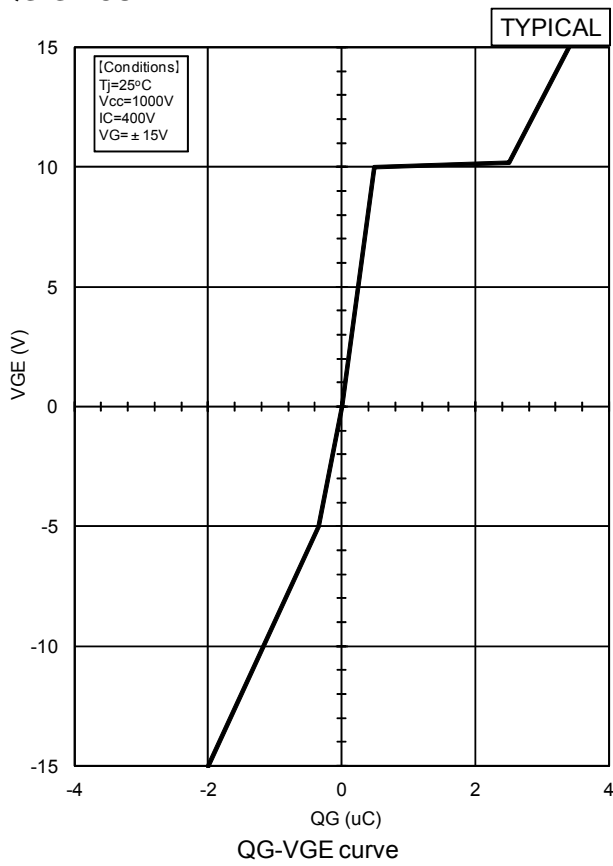
Material declaration

Please note the following materials are contained in the product, in order to keep characteristic and reliability level.

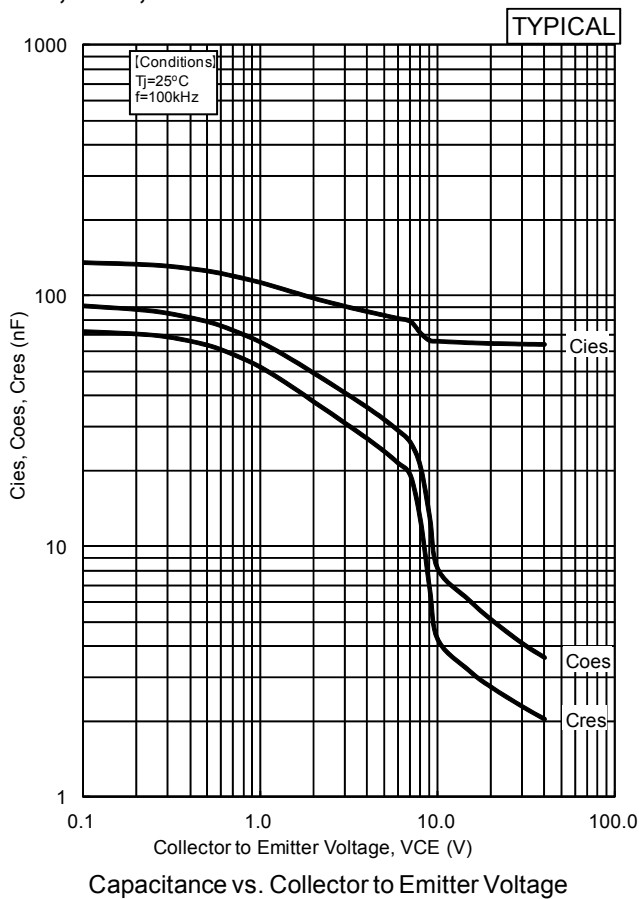
Material	Contained part
Lead (Pb) and its compounds	Solder

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QG-GV CURVE



Cies, Coes, Cres curve



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HITACHI POWER SEMICONDUCTORS

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