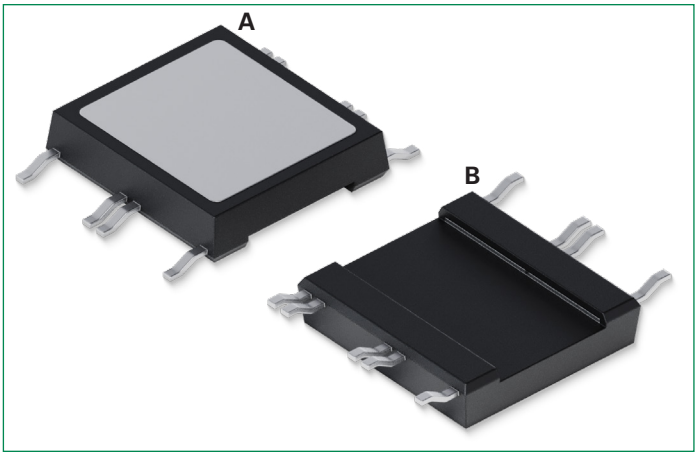
MMIX4G20N250

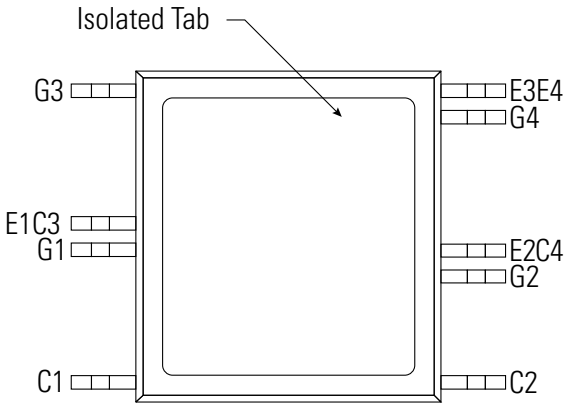
2500 V, 23 A
High Voltage IGBT

RoHS

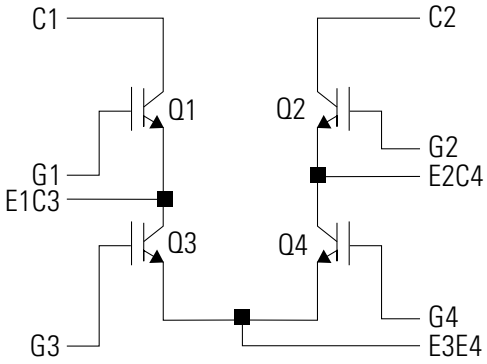


A: Top, **B:** Bottom

Pinout Diagram (SMPD-Y)



Top View



G: Gate; **C:** Collector; **E:** Emitter

Description

The MMIX4G20N250 is a high-voltage IGBT from Littelfuse / IXYS configured as an H-bridge with four transistors, rated for up to 2500V collector-emitter voltage and 23 A continuous collector current at 25 °C. It features an electrically isolated tab built on a Direct-Copper Bond substrate with 4000 V isolation, and a low saturation voltage of 3.1 V.

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4000 VAC Electrical Isolation
- High Peak Current Capability
- Low Saturation Voltage
- Molding Epoxies Meet UL 94 V-0 Flammability Classification

Benefits

- High Power Density through compact, SMT package
- Top-side tab enables easier heat sink mounting

Applications

- Capacitor Discharge
- Pulser Circuits

Product Summary

Characteristic	Value	Unit
V_{CES}	2500	V
I_{C25}	23	A
$V_{CE(sat)}$	≤ 3.1	V

Maximum Ratings (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristics	Conditions		Value	Units
V_{CES}	Collector-Emitter Voltage	T_{vj} = 25 °C to 150 °C		2500	V
V_{CGR}	Gate-Collector Voltage	T_{vj} = 25 °C to 150 °C, R_{GE} = 1 MΩ		3000	V
V_{GES}	Gate-Emitter Voltage	–		±20	V
V_{GEM}	Transient Gate-emitter Voltage	–		±30	V
I_C	Collector Current	T_c = 25 °C		23	A
		T_c = 90 °C		14	A
I_{CM}	Peak Collector Current	T_c = 25 °C, V_{GE} = 19 V	t_p = 1 ms	105	A
			t_p = 10 ms	55	
P_{tot}	Total Power Dissipation	T_c = 25 °C		100	W
T_{vj}	Virtual Junction Temperature Range	–		–55 to +150	°C
T_{stg}	Storage Temperature Range	–		–55 to +150	°C
T_{sold}	Soldering Temperature	–		260	°C
V_{isol}	Isolation Withstand Voltage	f = 50 / 60 Hz, t = 1 min		4000	V
SSOA (RBSOA)	Switching safe operating area (Reverse biased safe operating area)	V_{GE} = 15 V, T_{vj} = 125 °C, R_G = 20 Ω, Clamped Inductive Load @ V_{CE} = 1500 V		60	A

Electrical Characteristics – Static (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristics	Conditions		Value			Units
				Min.	Typ.	Max.	
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	V_{GE} = 0 V, I_C = 250 µA		2500	–	–	V
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	V_{CE} = V_{GE}, I_C = 250 µA		3.0	–	5.0	V
V_{CEsat}	Collector-Emitter Saturation Voltage[1]	V_{GE} = 15 V, I_C = 20 A		–	–	3.1	V
I_{CES}	Collector-Emitter Leakage Current[2]	V_{CE} = 0.8 x V_{CES}, V_{GE} = 0 V	T_{vj} = 25 °C	–	–	10	µA
			T_{vj} = 125 °C	–	–	750	µA
I_{GES}	Gate Leakage Current	V_{CE} = 0 V, V_{GE} = ±20 V		–	–	±100	nA

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%
Note 2: Device must be mounted to a heatsink for high temperature leakage current measurements to avoid thermal runaway

Electrical Characteristics – Dynamic (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
C_{ies}	Input Capactitance	V_{CE} = 15 V, V_{GE} = 20 V, f = 1 MHz	–	1190	–	pF
C_{oes}	Output Capacitance		–	53	–	
C_{res}	Reverse Transfer Capacitance		–	18	–	
Q_G	Total Gate Charge	I_C = 20 A, V_{GE} = 15 V, V_{CE} = 1000 V	–	53	–	nC
Q_{GE}	Gate-Emitter Charge		–	8	–	
Q_{GC}	Gate-Collector Charge		–	22	–	
g_{fs}	Transconductance[1]	V_{CE} = 10 V, I_C = 20 A	–	20	–	S
$t_{d(on)}$	Turn-on Delay Time	Resistive Load, V_{CE} = 1250 V, V_{GE} = 15 V, I_C = 40 A, R_G= 10 Ω	–	57	–	ns
t_r	Rise Time		–	160	–	
$t_{d(off)}$	Turn-off Delay Time		–	136	–	
t_f	Fall Time		–	930	–	
$I_{C(on)}$	Collector On-State Current[1]	V_{GE} = 20 V, V_{CE} = 15 V	–	190	–	A

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%

Thermal Characteristics

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance Junction To Case - IGBT	–	–	–	1.25	K/W
$R_{th(c-sold)}$	Thermal Resistance Case To Soldering Point -IGBT	–	–	0.05	–	K/W
$R_{th(j-a)}$	Thermal Resistance Junction To Ambient - IGBT	–	–	30	–	K/W

Package

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
G	Package Weight	–	–	8	–	g
F	Mounting Force	–	11 / 50	–	-45 / 200	Nm/lb.in.

Characteristic Curves

Fig. 1. Typical Output Characteristics @ T_{vj} = 25 ºC

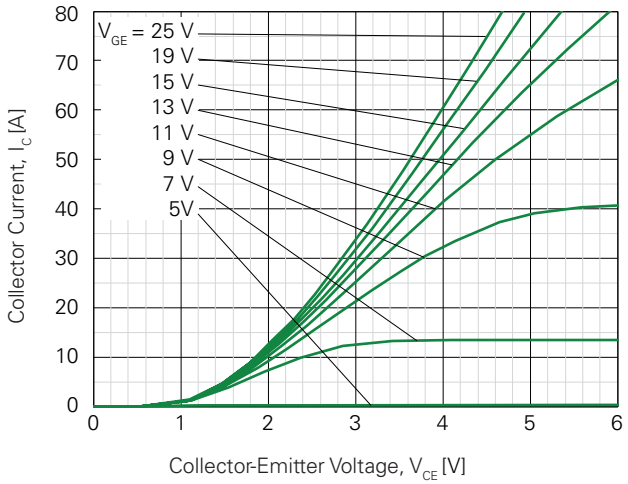


Fig. 2. Typical Extended Output Characteristics @ T_{vj} = 25 ºC

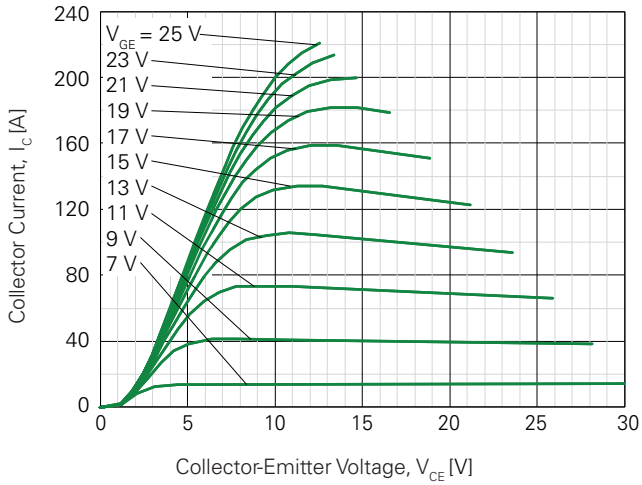


Fig. 3. Typical Output Characteristics @ T_{vj} = 125 ºC

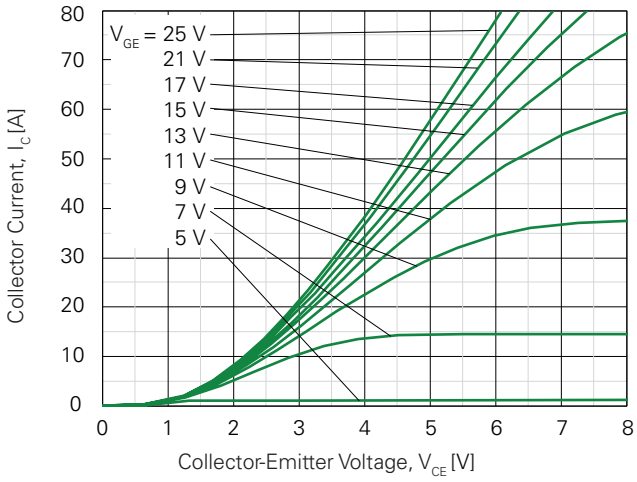


Fig. 4. Typical Collector-Emitter Saturation Voltage vs. Virtural Junction Temperature

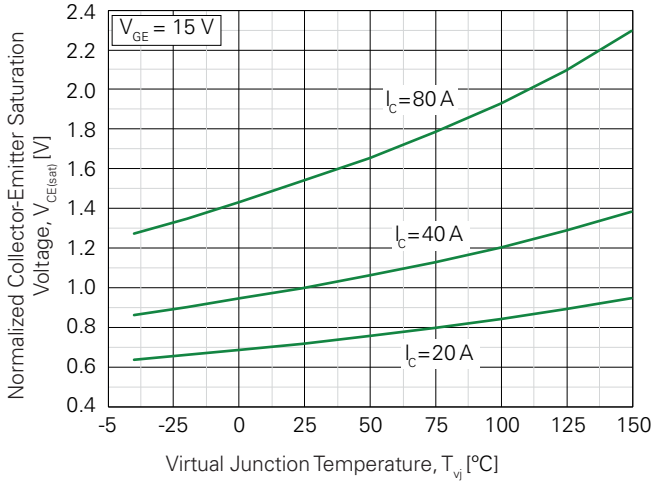


Fig. 5. Typical Collector-Emitter Voltage vs. Gate-Emitter Voltage

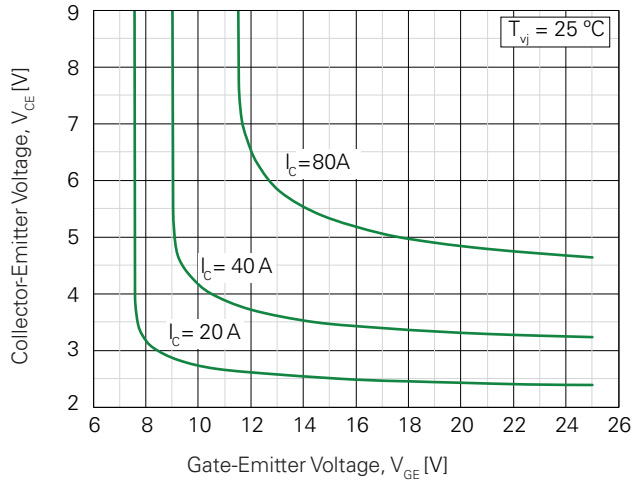
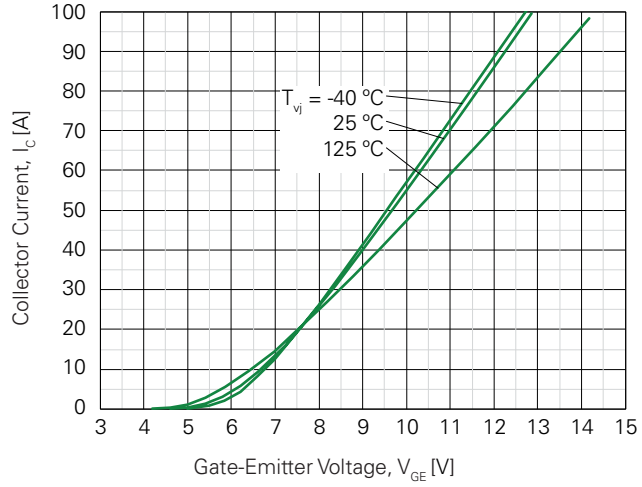


Fig. 6. Typical Transfer Characteristics



Characteristic Curves

Fig. 7. Typical Transconductance

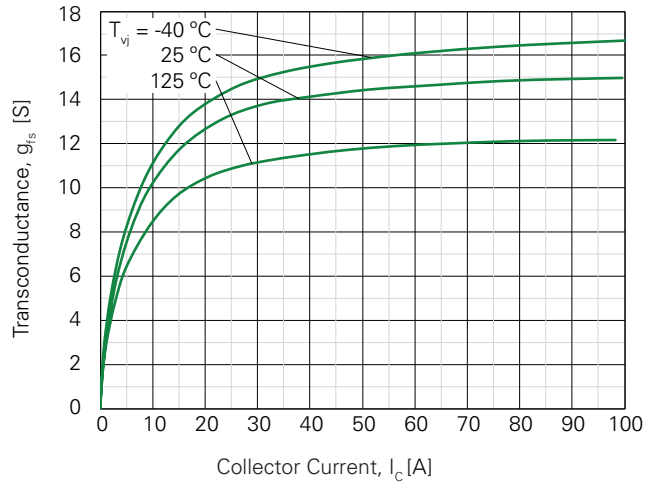


Fig. 8. Typical Gate Charge Characteristics

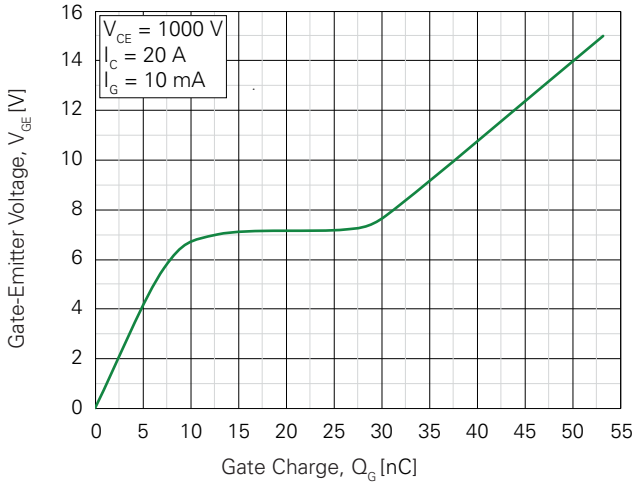


Fig. 9. Reverse-Bias Safe Operating Area (RBSOA)

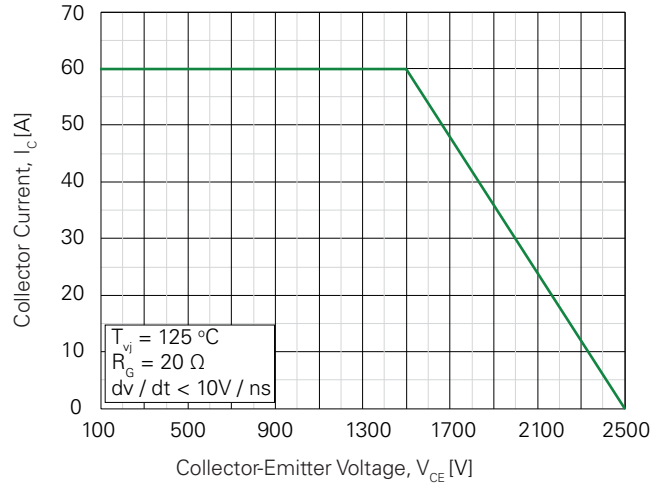


Fig. 10. Typical Junction Capacitance Characteristics

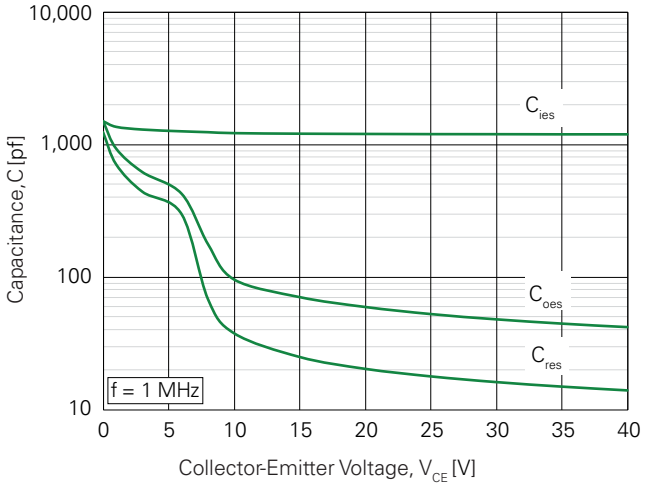


Fig. 11. Transient thermal impedance - IGBT

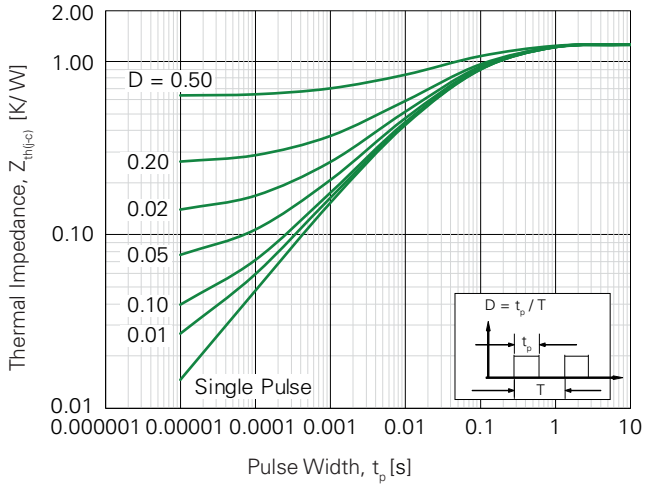
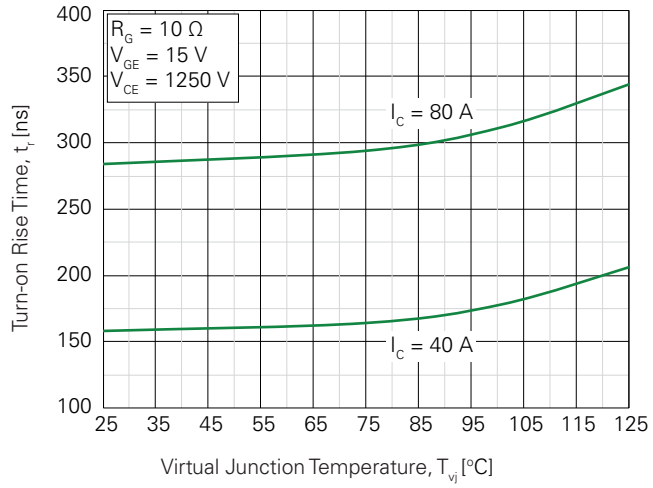


Fig. 12. Resistive Turn-on Rise Time vs. Junction Temperature



Characteristic Curves

Fig. 13. Resistive Turn-on Rise Time vs. Collector Current

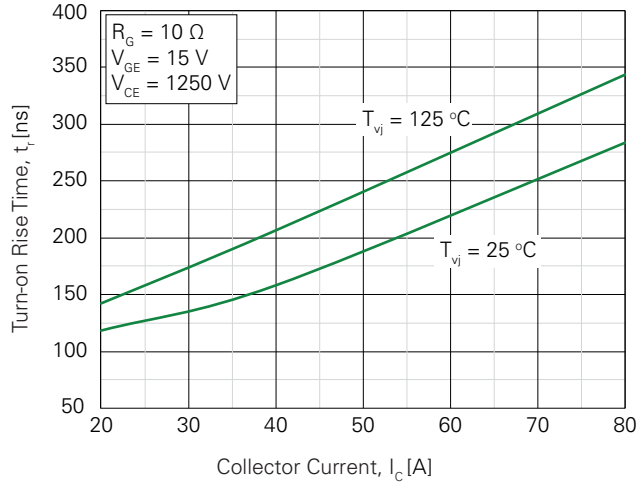


Fig. 14. Resistive Turn-on Switching Times vs. Gate Resistance

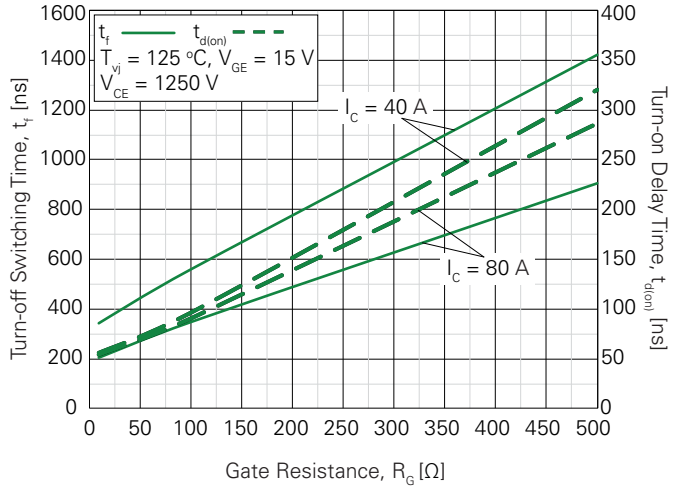


Fig. 15. Resistive Turn-off Switching Times vs. Junction Temperature

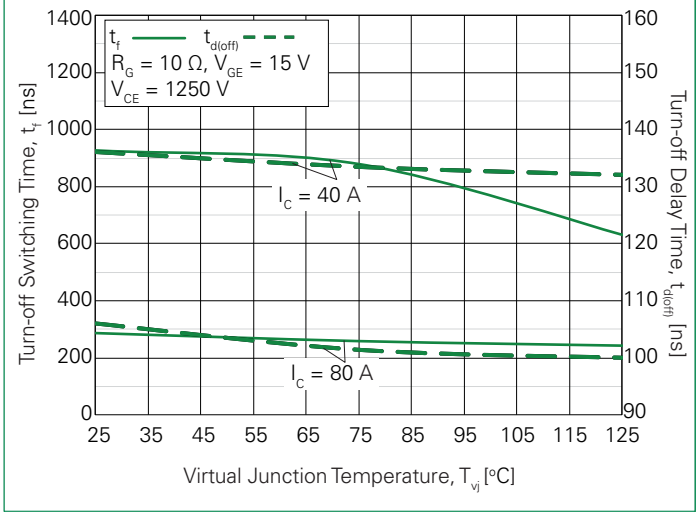


Fig. 16. Resistive Turn-off Switching Times vs. Collector Current

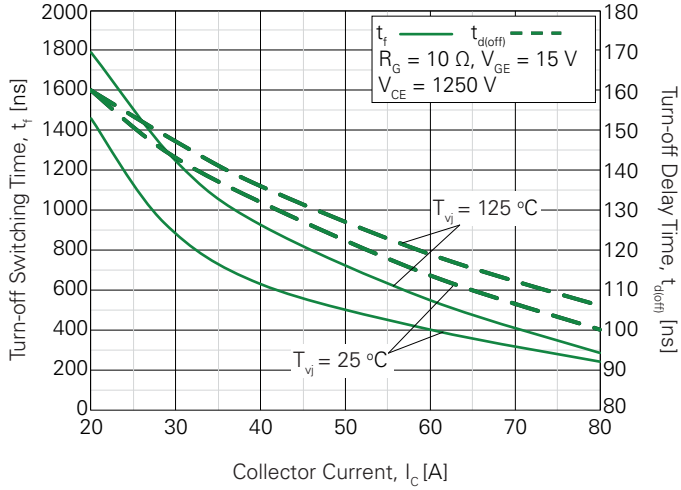
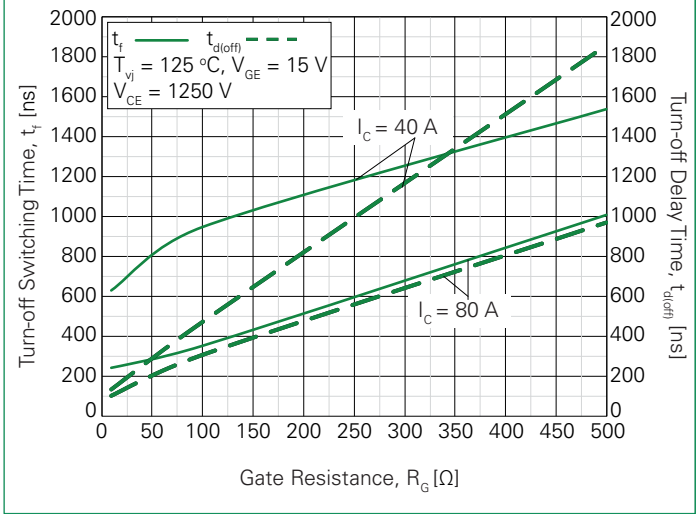
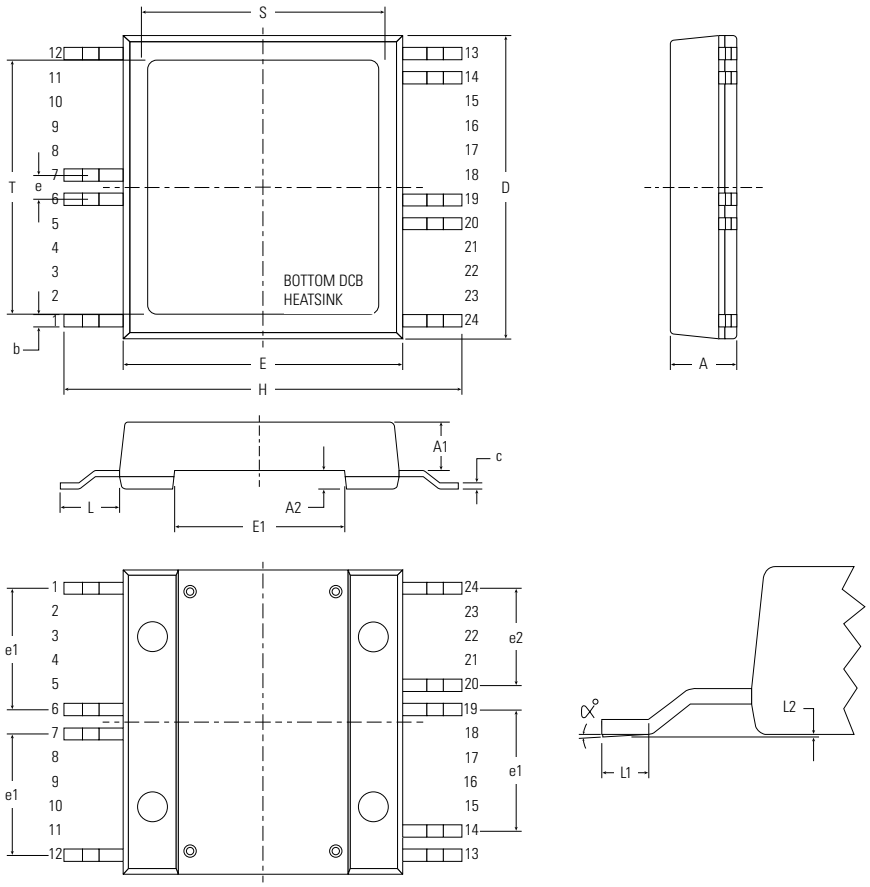


Fig. 17. Resistive Turn-off Switching Times vs. Gate Resistance



Part Outline Drawing (SMPD-Y)

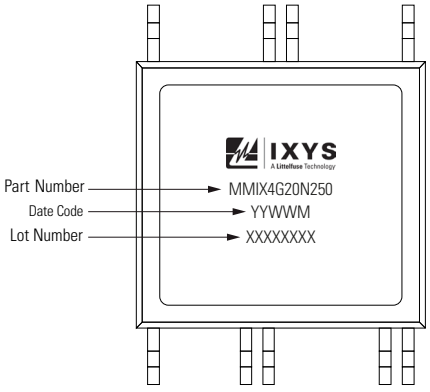


Symbol	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A1	0.209	0.224	5.30	5.70
A2	0.154	0.161	3.90	4.10
A2	0.055	0.063	1.40	1.60
b	0.035	0.045	0.90	1.15
c	0.018	0.026	0.45	0.65
D	0.976	0.994	24.80	25.25
E	0.898	0.559	22.80	23.25
E1	0.543	0.559	13.80	14.20
e	0.079 BSC		2.00 BSC	
e1	0.394 BSC		10.00 BSC	
e2	0.315 BSC		8.00 DSC	
H	1.272	1.311	32.30	33.30
L	0.181	0.209	4.60	5.30
L1	0.051	0.067	1.30	1.70
L2	0.000	0.006	0.00	0.15
S	0.742	0.792	18.85	20.12
T	0.822	0.872	20.90	22.17
∝	0	4°	0	4°

Ordering Information

Orderable Part Number	Package Type	Shipping Form	Shipping Quantity
MMIX4G20N250	SMPD-Y	T&R	200
MMIX4G20N250	SMPD-Y	Tube	20

Part Numbering and Marking



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