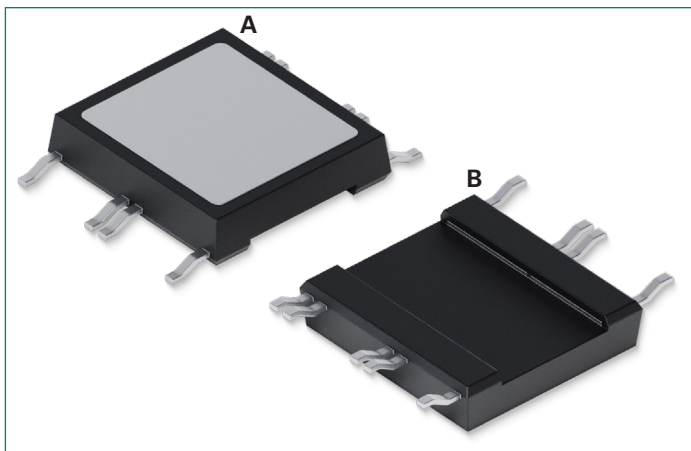


MMIX4G20N250

2500 V, 23 A

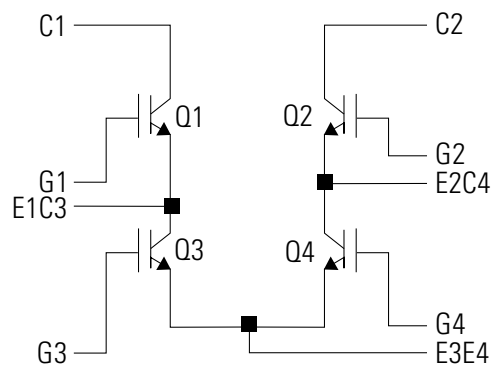
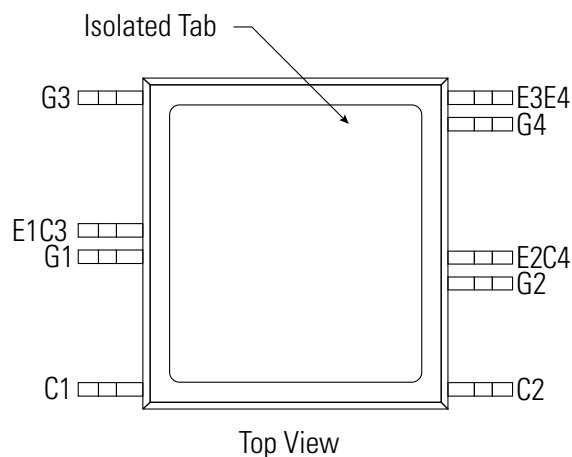
High Voltage IGBT

RoHS



A: Top, B: Bottom

Pinout Diagram (SMPD-Y)



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 ($T_{vj} = 25\text{ }^{\circ}\text{C}$ 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 ($T_{vj} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

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

Note 1: Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle, $d \leq 2\%$ **Note 2:** Device must be mounted to a heatsink for high temperature leakage current measurements to avoid thermal runaway

Electrical Characteristics – Dynamic ($T_{vj} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
C_{ies}	Input Capacitance	$V_{CE} = 15\text{ V}, V_{GE} = 20\text{ V}, f = 1\text{ MHz}$	–	1190	–	pF
C_{oes}	Output Capacitance		–	53	–	
C_{res}	Reverse Transfer Capacitance		–	18	–	
Q_G	Total Gate Charge	$I_C = 20\text{ A}, V_{GE} = 15\text{ V}, V_{CE} = 1000\text{ V}$	–	53	–	nC
Q_{GE}	Gate-Emitter Charge		–	8	–	
Q_{GC}	Gate-Collector Charge		–	22	–	
g_{fs}	Transconductance ¹	$V_{CE} = 10\text{ V}, I_C = 20\text{ A}$	–	20	–	S
$t_{d(on)}$	Turn-on Delay Time	Resistive Load, $V_{CE} = 1250\text{ V},$ $V_{GE} = 15\text{ V},$ $I_C = 40\text{ A},$ $R_G = 10\text{ }\Omega$	–	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	$V_{GE} = 20\text{ V}, V_{CE} = 15\text{ V}$	–	190	–	A

Note 1: Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle, $d \leq 2\%$

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

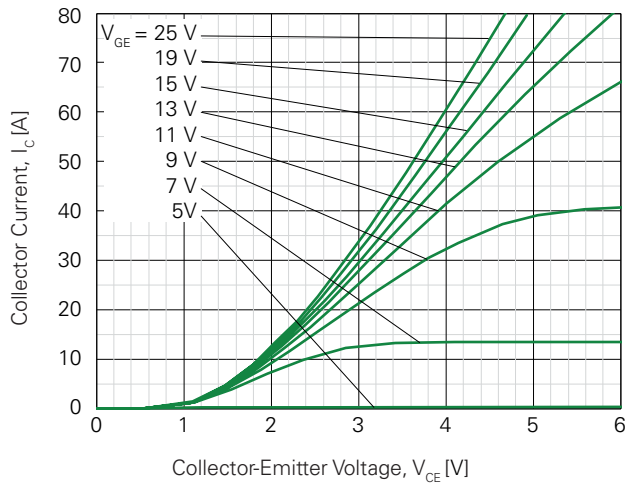
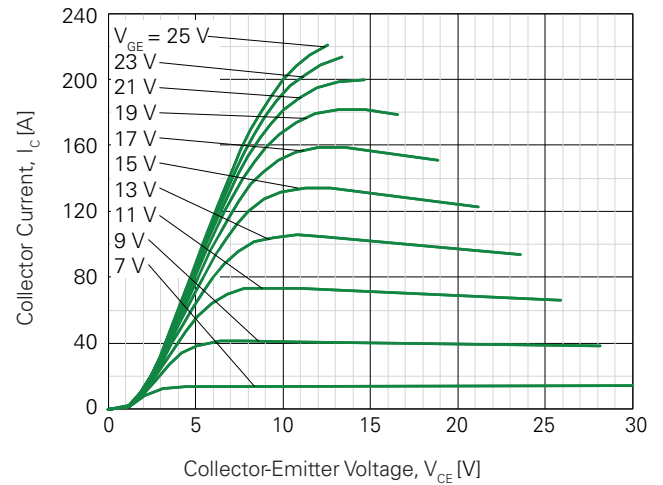
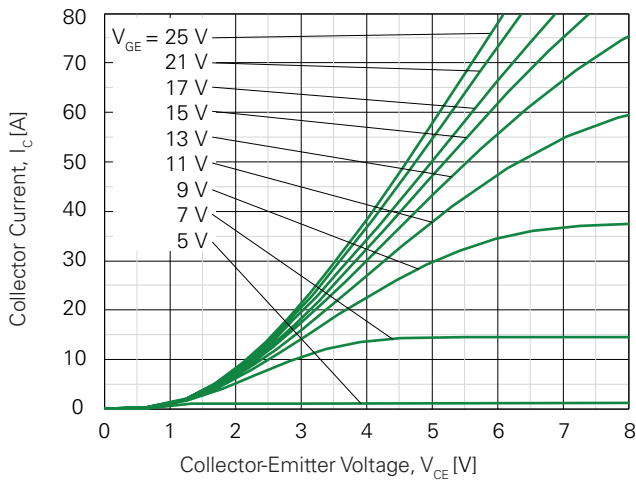
Fig. 1. Typical Output Characteristics @ $T_{vj} = 25^\circ\text{C}$ Fig. 2. Typical Extended Output Characteristics @ $T_{vj} = 25^\circ\text{C}$ Fig. 3. Typical Output Characteristics @ $T_{vj} = 125^\circ\text{C}$ 

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

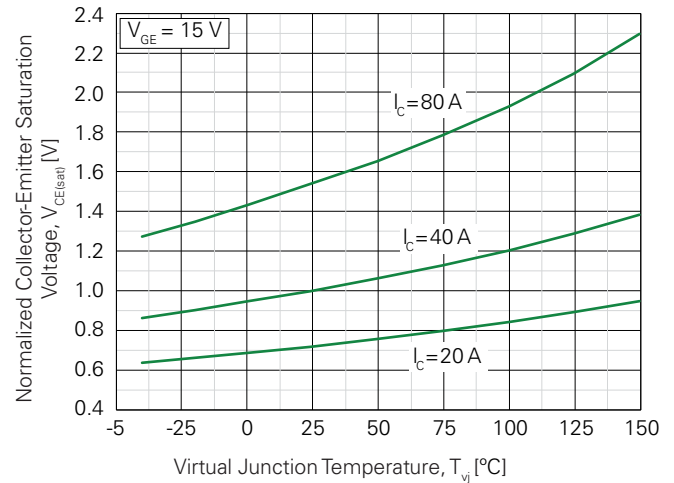


Fig. 5. Typical Collector-Emitter Voltage vs. Gate-Emitter Voltage

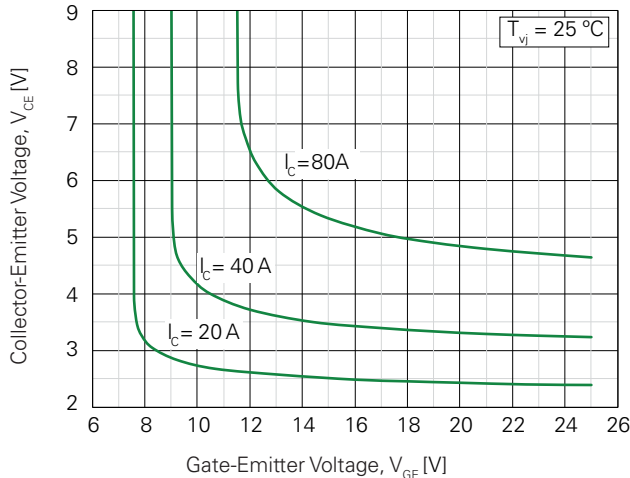
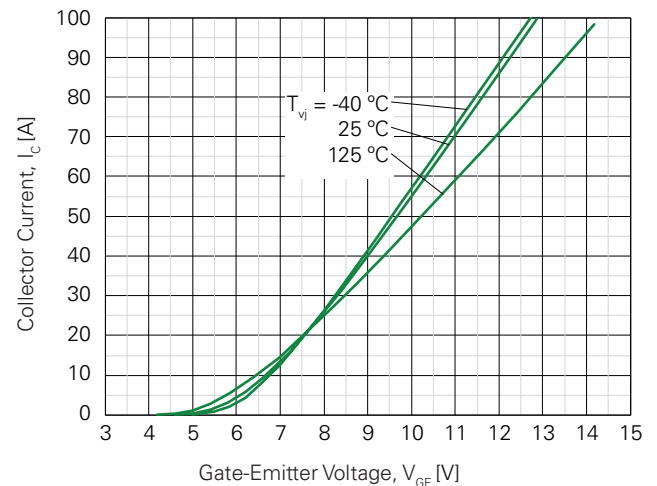


Fig. 6. Typical Transfer Characteristics



Characteristic Curves

Fig. 7. Typical Transconductance

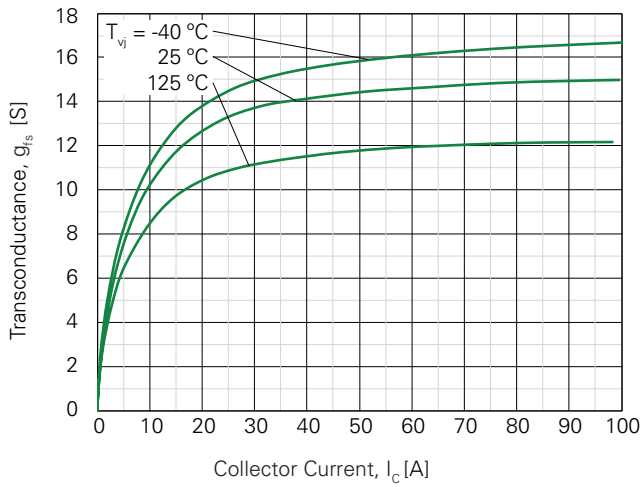


Fig. 8. Typical Gate Charge Characteristics

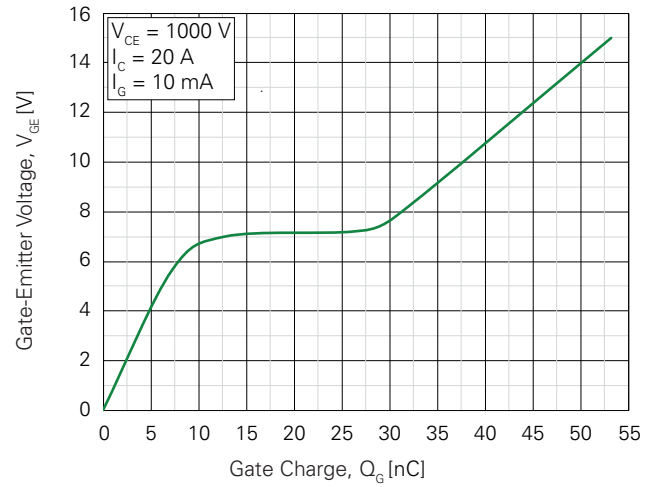


Fig. 9. Reverse-Bias Safe Operating Area (RBSOA)

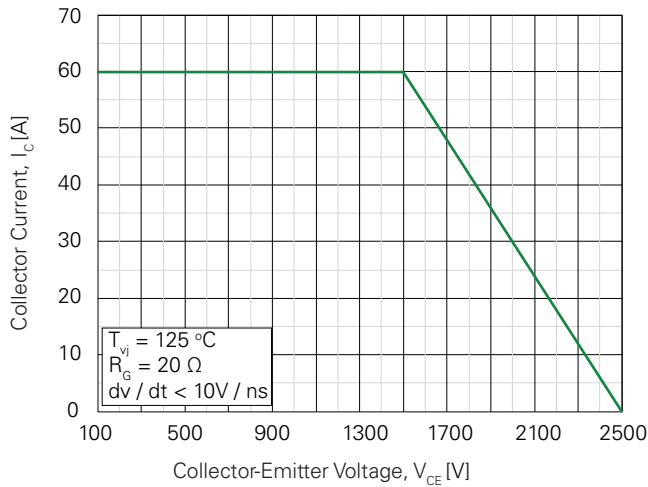


Fig. 10. Typical Junction Capacitance Characteristics

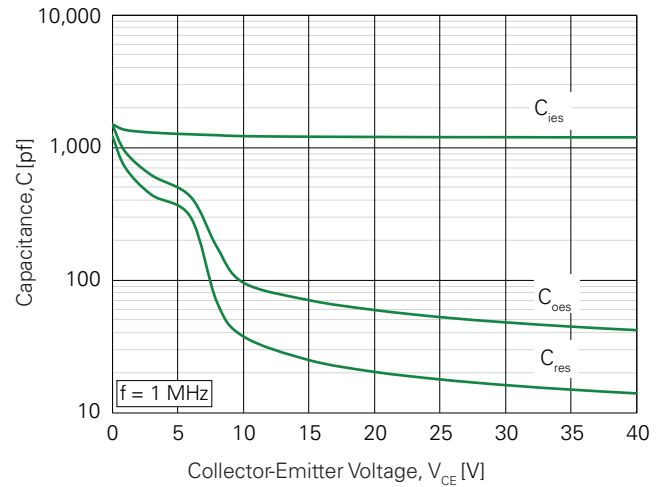


Fig. 11. Transient thermal impedance - IGBT

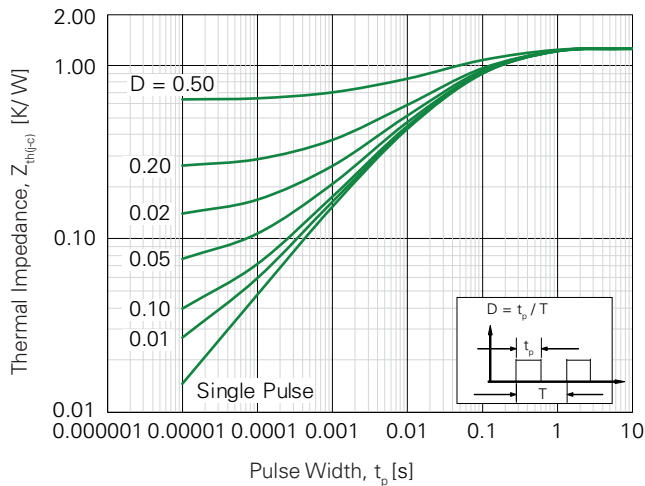
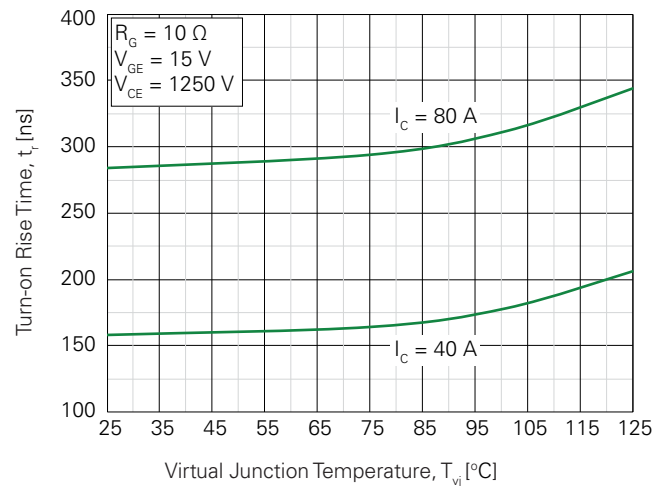


Fig. 12. Resistive Turn-on Rise Time vs. Junction Temperature



Characteristic Curves

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

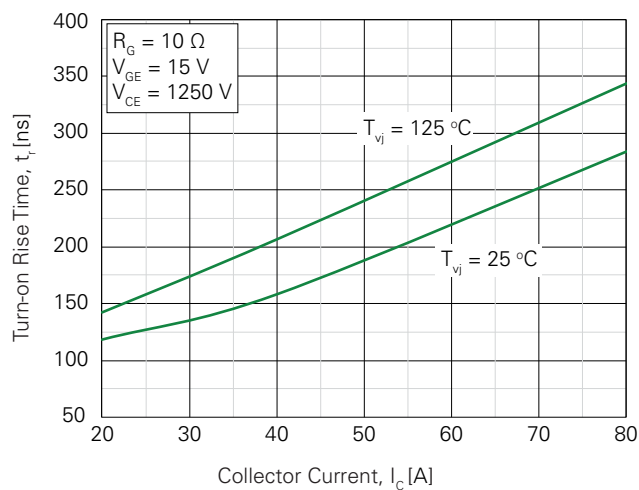


Fig. 14. Resistive Turn-on Switching Times vs. Gate Resistance

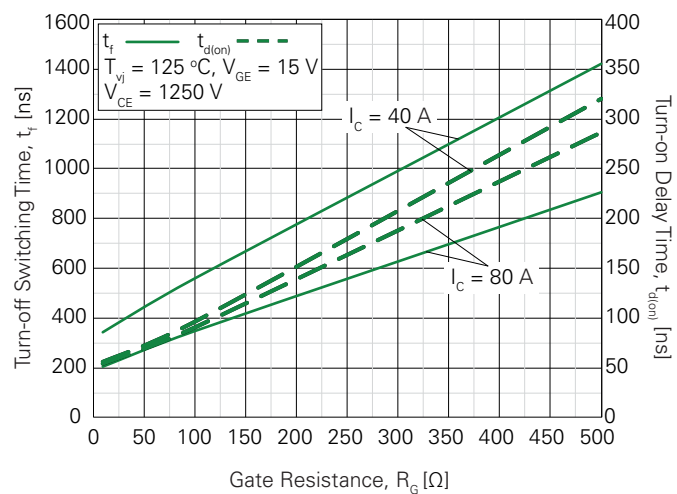


Fig. 15. Resistive Turn-off Switching Times vs. Junction Temperature

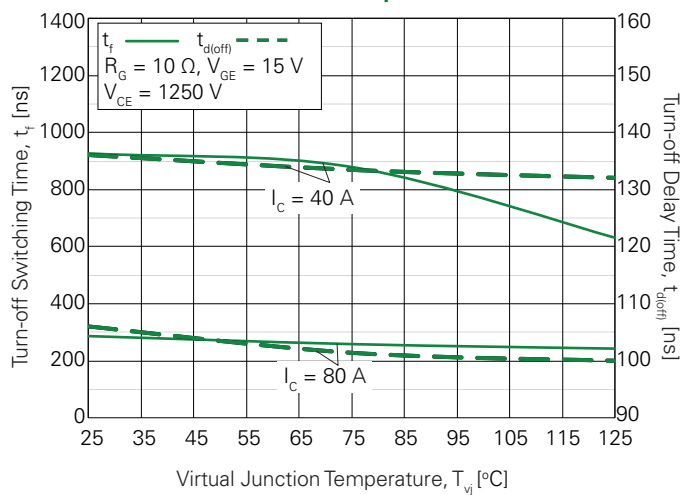


Fig. 16. Resistive Turn-off Switching Times vs. Collector Current

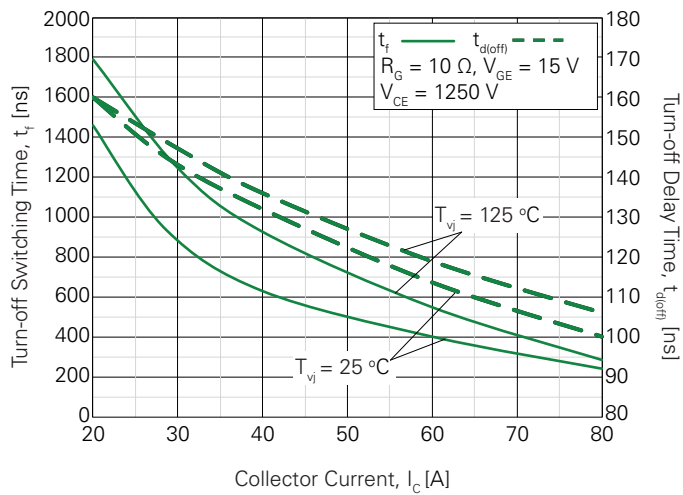
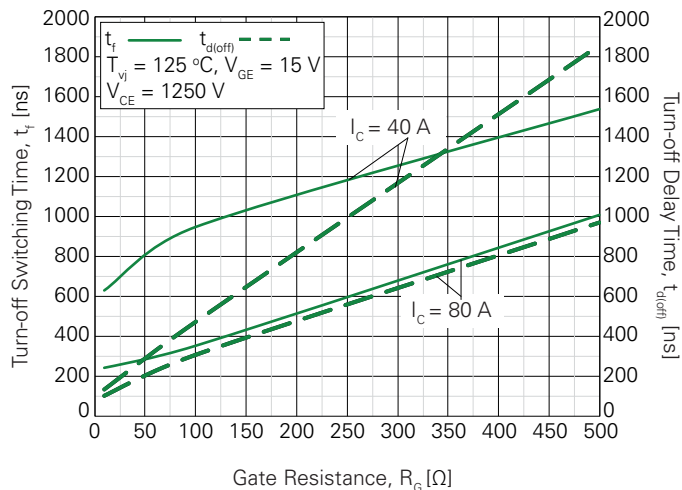
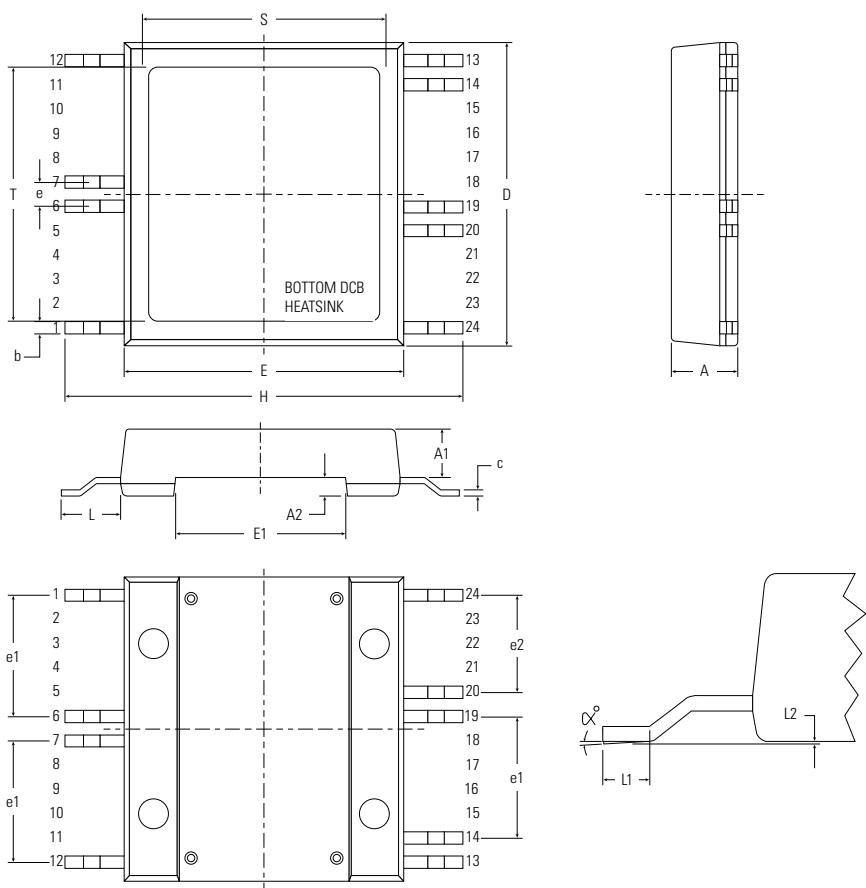


Fig. 17. Resistive Turn-off Switching Times vs. Gate Resistance



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
α	0	4°	0	4°

Ordering Information

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

Disclaimer Notice
Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications.
Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.



Part of:

