Features

◆ECMOS's Proprietary Trench IGTO Technology
◆Extremely $V_{CE,SAT}$
◆Extremely Low E_{TS}
◆Integrated SuperBallast™ Technology for Safe, Simple Paralleling
◆Square Turn-Off SOA >4x Rated Current
◆Low turnoff voltage spike

Applications

◆Uninterruptable Power Supplies (UPS)
◆Solar Inverters
◆Welding Equipment
◆Power Factor Correction (PFC)

Product Summary

Current (A)	Voltage (V)	VCE,sat (V)	Package
30	600	1.4	Die

Absolute Maximum Ratings

Stresses above those specified under Absolute Maximum Ratings may cause permanent damage to the device and/or affect device reliability. These are stress ratings only; functional operation of the device at these or any other conditions outside those indicated in the Specification Table is not implied.
Absolute maximum ratings apply individually only, not in combination. Unless otherwise specified, all voltages are referenced to GND.

Symbol	Parameter	Min	Typ	Max	Unit
V_{CE}	Collector-to-Emitter Voltage			600	V
$I_{CE,DC}$	DC Collector Current Note 1.				
$I_{CE,P}$	Pulsed Collector Current.				A
V_{GE}	Gate-to-Emitter Voltage	-20		20	V
T_J	Operating Junction Temperature	-40		150	℃
T_{STG}	Storage Temperature	-55		150	℃

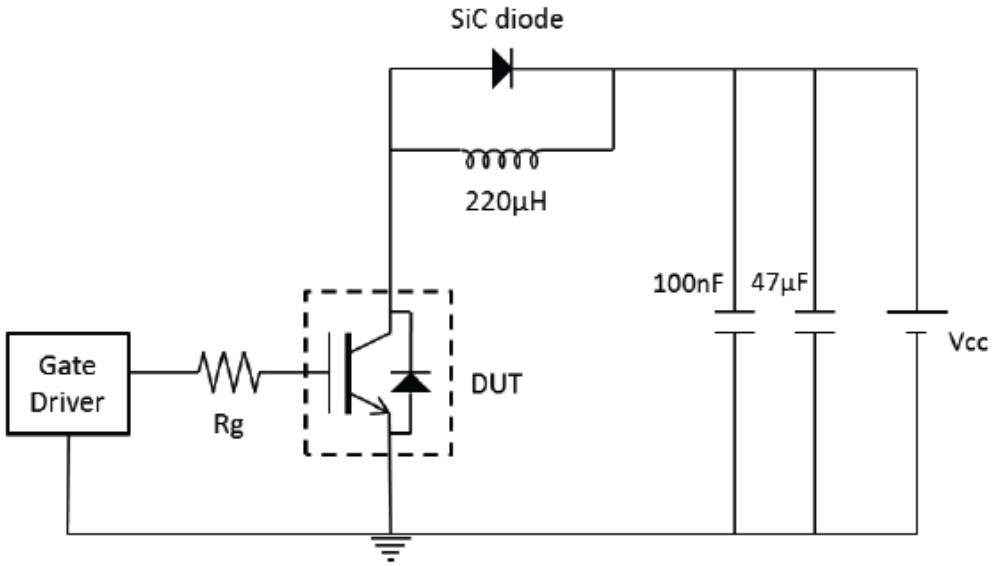
Note 1: Limited by $T_{J,MAX}$. Depends upon thermal properties of assembly.

Electrical Specifications

All specifications are tested at T_J=25°C, unless otherwise specified.

Symbol	Parameter	Min	Typ	Max	Unit
$V_{BR,CE}$	Collector-to-Emitter Breakdown Voltage				
	V_{GE}=0V, I_C=250μA	600.0			V
$V_{CE,SAT}$	Collector-to-Emitter Saturation Voltage				
	I_C=20A, V_{GE}=15V		1.67		V
	I_C=20A, V_{GE}=15V, T_J=150°C		1.4		V
	I_C=40A, V_{GE}=15V		2.1		V
V_{GE}	Gate Threshold Voltage				
	V_{CE}=V_{GE}, I_C=250μA		3.8	5.4	V
I_{CES}	Collector Leakage Current				
	V_{GE}=0V, V_{CE}=600V		0.2	20.0	μA
	V_{GE}=0V, V_{CE}=600V, T_J=150°C		2000.0		μA
I_{CES}	Gate Leakage Current				
	V_{GE}=20V, V_{CE}=0V			200.0	nA
C_{IES}	Gate Emitter Capacitance				
	V_{GE}=0V, V_{CE}=25V, f=1MHz		3500.0		pF
C_{OES}	Output Capacitance				
	V_{GE}=0V, V_{CE}=25V, f=1MHz		24.0		pF
C_{RES}	Reverse Transfer Capacitance				
	V_{GE}=0V, V_{CE}=25V, f=1MHz		18.0		pF

Inductive Load Test Circuit



Switching Characteristics

Switching characteristics represent typical performance when product is packaged in a TO-220. Switching characteristics may differ for different packaging.

I_C=20A, V_{CC}=400V, V_{GE}=15V, V_{CC}=400V, R_G=6Ω, Energy includes tail.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{d,ON}$	Turn-on Delay Time		44.0		ns
t_r	Turn-on Rise Time		51.0		ns
$t_{d,OFF}$	Turn-off Delay Time		135.0		ns
t_f	Turn-off Fall Time		75.0		ns
E_{ON}	Turn-on Switching Loss		0.34		mJ
E_{OFF}	Turn-off Switching Loss		0.32		mJ
E_{TS}	Total Switching Loss		0.66		mJ

T_J=100°C, I_C=20A, V_{CC}=400V, V_{GE}=15V, V_{CC}=400V, R_G=6Ω, Energy includes tail.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{d,ON}$	Turn-on Delay Time		48.0		ns
t_r	Turn-on Rise Time		50.0		ns
$t_{d,OFF}$	Turn-off Delay Time		167.0		ns
t_f	Turn-off Fall Time		61.0		ns
E_{ON}	Turn-on Switching Loss		0.33		mJ
E_{OFF}	Turn-off Switching Loss		0.38		mJ
E_{TS}	Total Switching Loss		0.71		mJ

T_J=150°C, I_C=20A, V_{CC}=400V, V_{GE}=15V, V_{CC}=400V, R_G=6Ω, Energy includes tail.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{d,ON}$	Turn-on Delay Time		50.0		ns
t_r	Turn-on Rise Time		51.0.		ns
$t_{d,OFF}$	Turn-off Delay Time		210.0		ns
t_f	Turn-off Fall Time		84.0		ns
E_{ON}	Turn-on Switching Loss		0.34		mJ
E_{OFF}	Turn-off Switching Loss		0.55		mJ
E_{TS}	Total Switching Loss		0.89		mJ

T_J=100°C, I_C=20A, V_{CC}=400V, V_{GE}=15V/-8V, V_{CC}=400V, R_G=6Ω, Energy includes tail.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{d,ON}$	Turn-on Delay Time		46.0		ns
t_r	Turn-on Rise Time		50.0		ns
$t_{d,OFF}$	Turn-off Delay Time		114.0		ns
t_f	Turn-off Fall Time		24.0		ns
E_{ON}	Turn-on Switching Loss		0.32		mJ
E_{OFF}	Turn-off Switching Loss		0.28		mJ
E_{TS}	Total Switching Loss		0.6		mJ

Typical Operating Characteristics

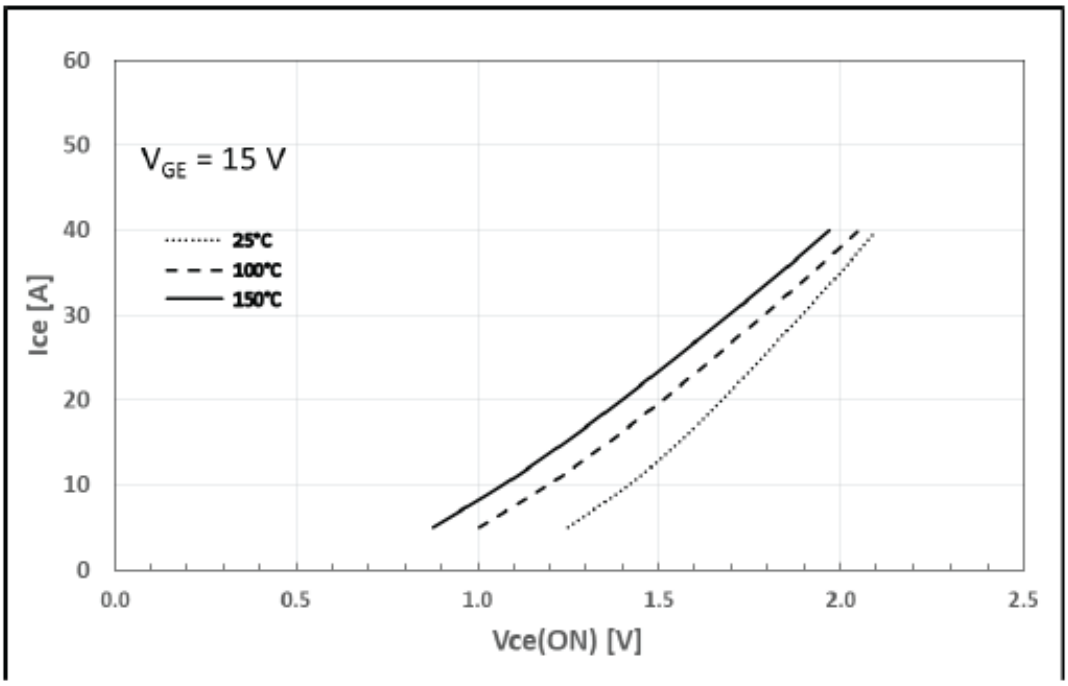


Figure 1: $V_{CE,SAT}$ vs. I_C for different temperatures

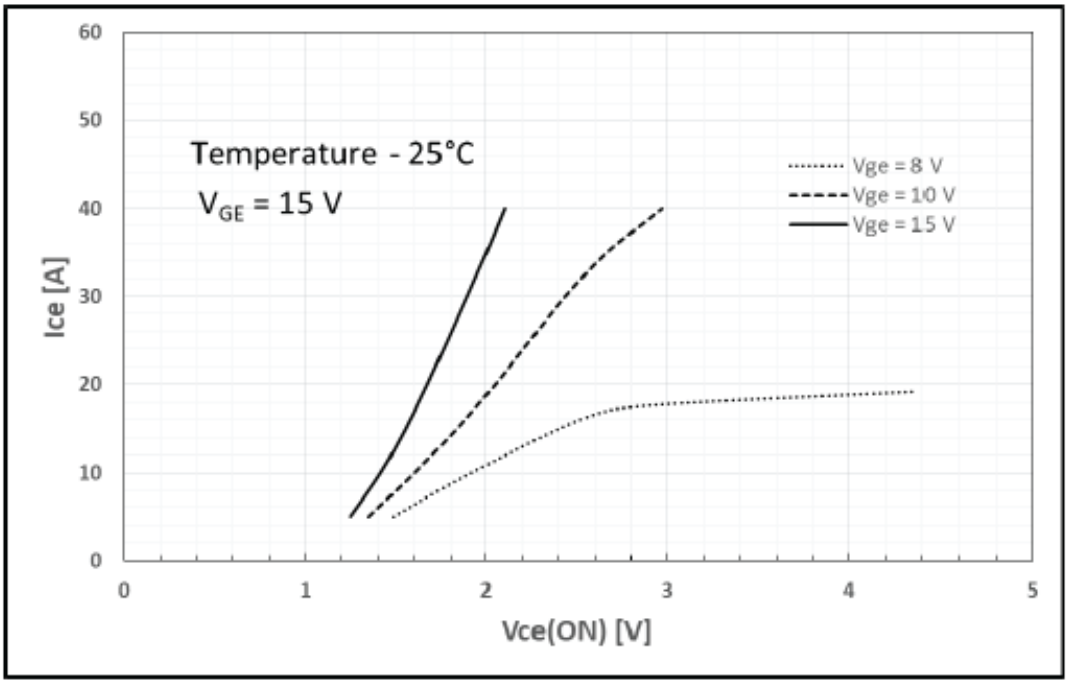


Figure 2: $V_{CE,SAT}$ vs. I_C for different V_{GE}

Typical Operating Characteristics

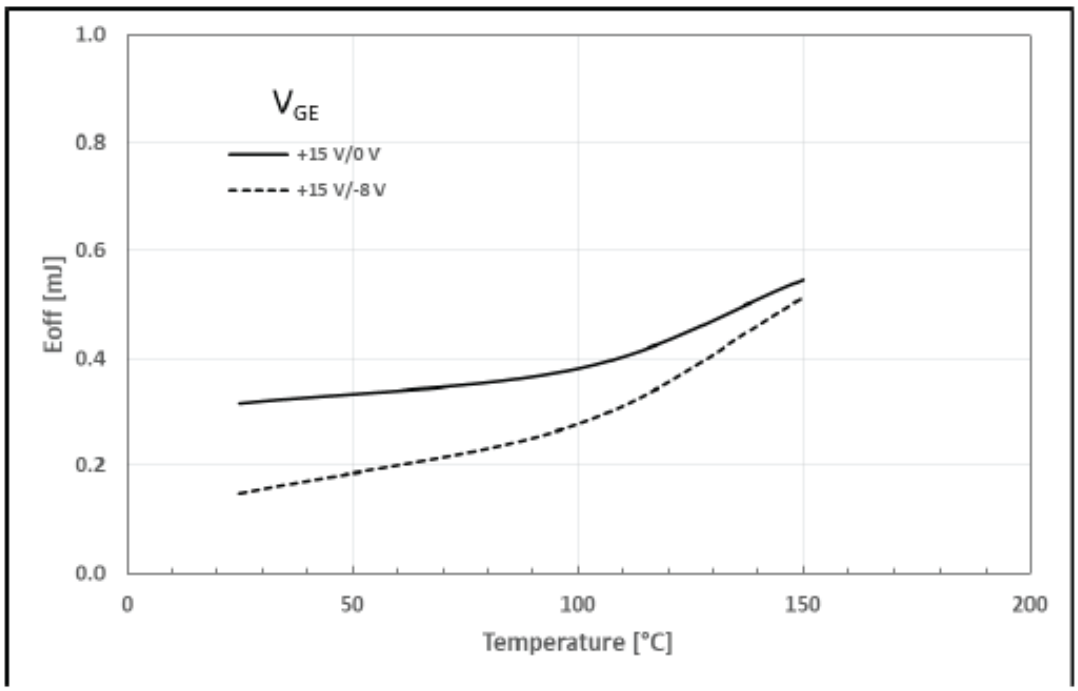


Figure 3: E_{OFF} vs. Temperature (I_{CE}=20A, V_{CC}=400V, V_{GE}=15V, R_G=6Ω)

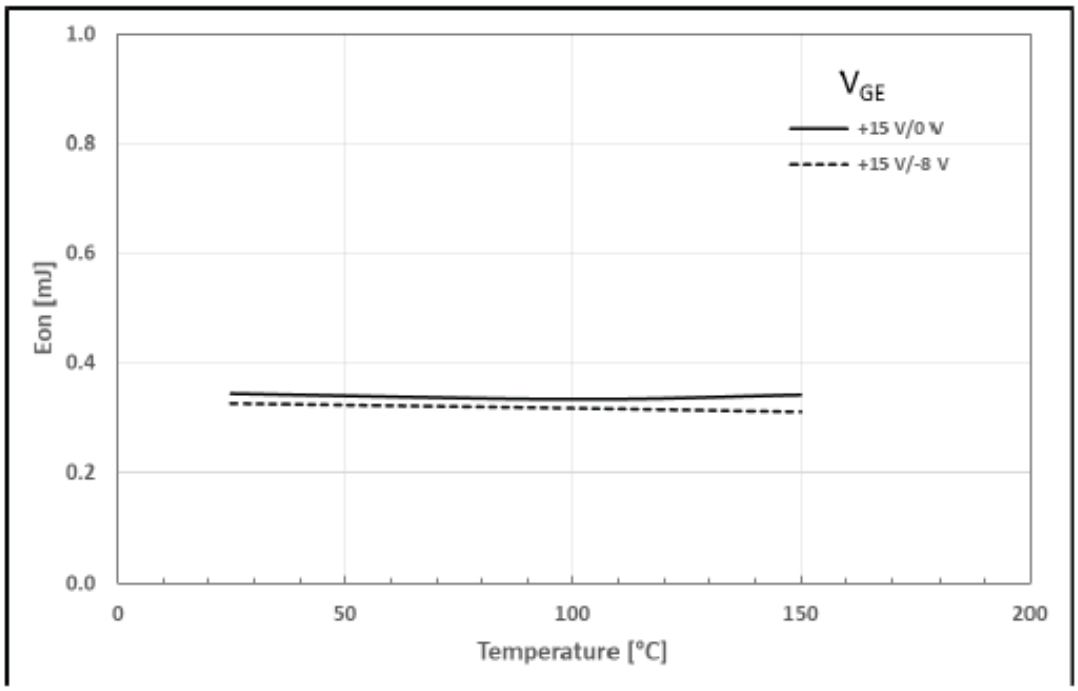


Figure 4: E_{ON} vs. Temperature (I_{CE}=20A, V_{CC}=400V, V_{GE}=15V, R_G=6Ω)

Typical Operating Characteristics

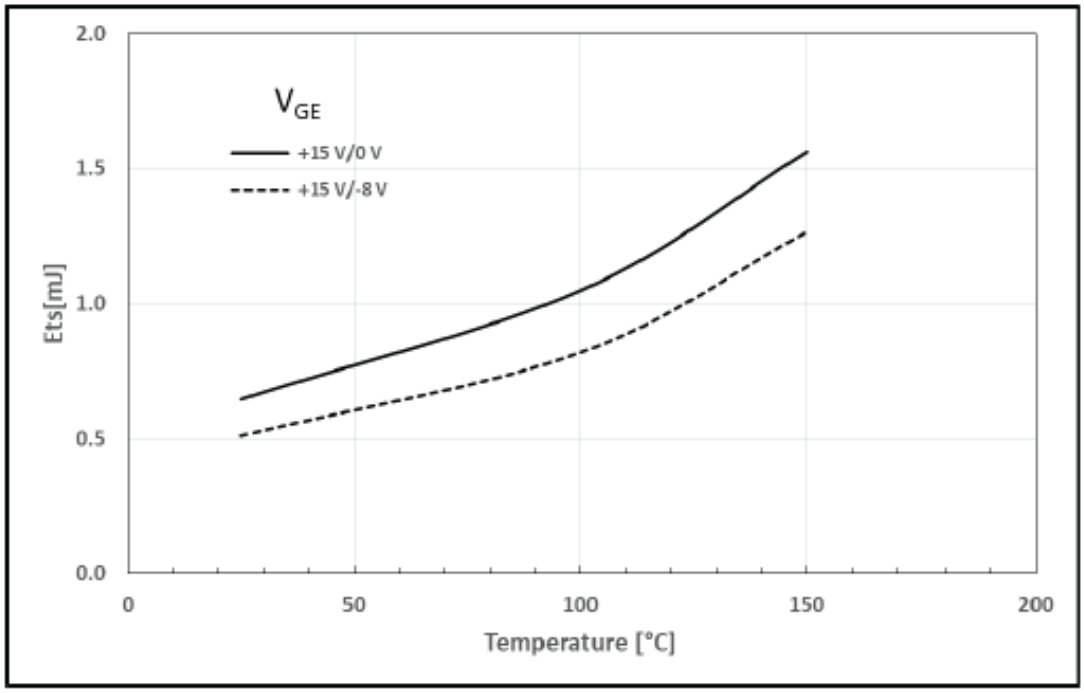


Figure 5: E_{TS} vs. Temperature (I_{CE}=20A, V_{CC}=400V, V_{GE}=15V, =R_G=6Ω)

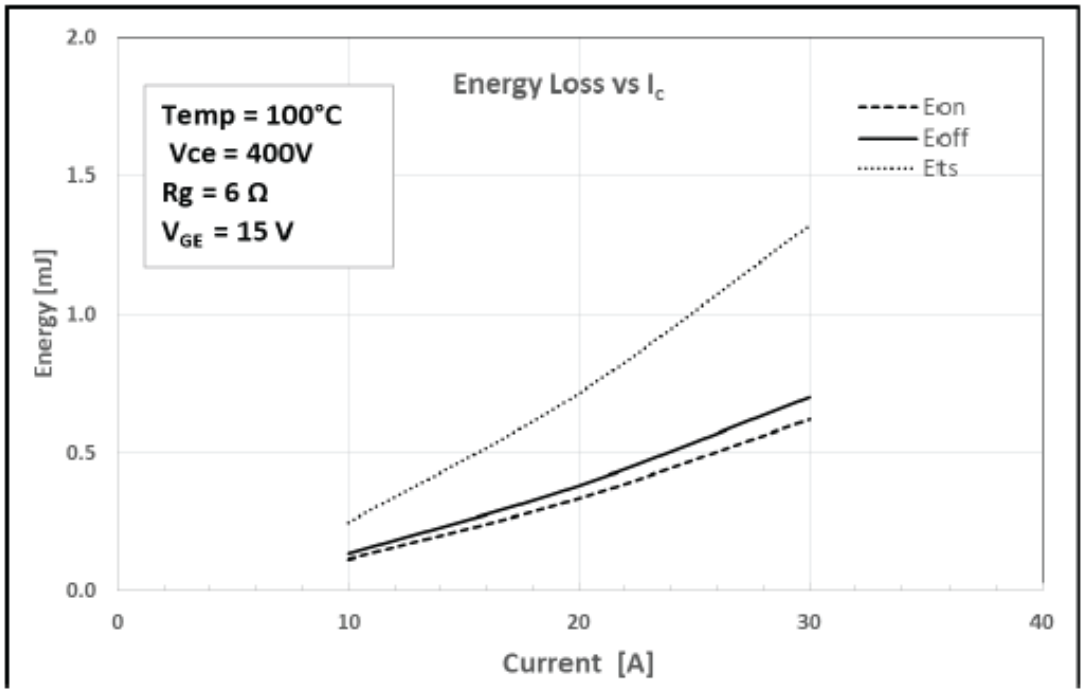


Figure 6: Energy Loss vs. Current

Typical Operating Characteristics

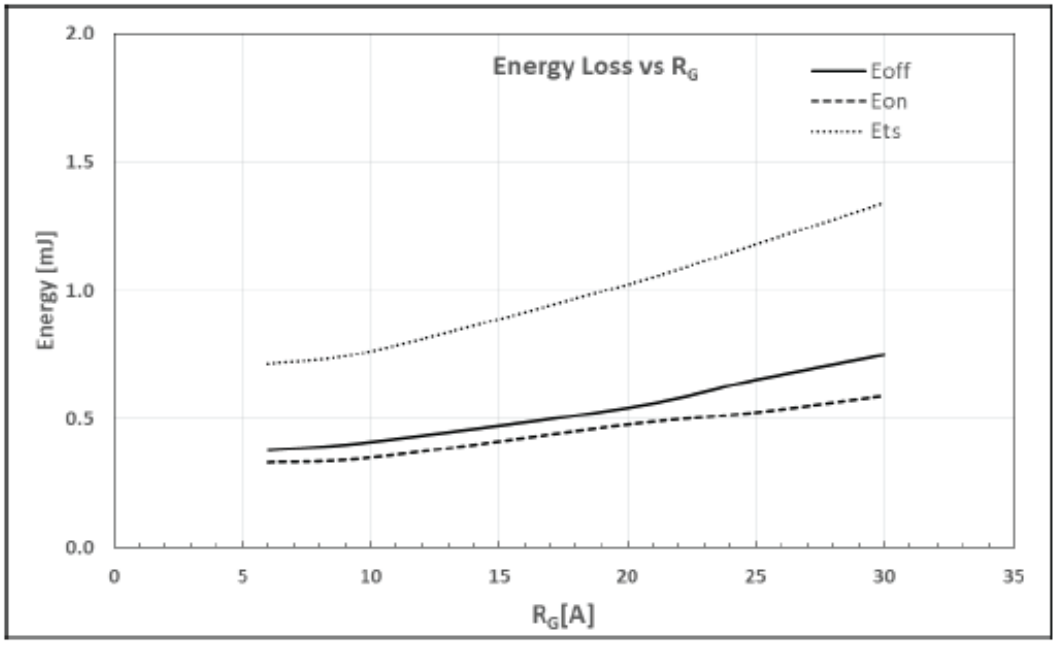


Figure 7: Energy Loss vs R_G

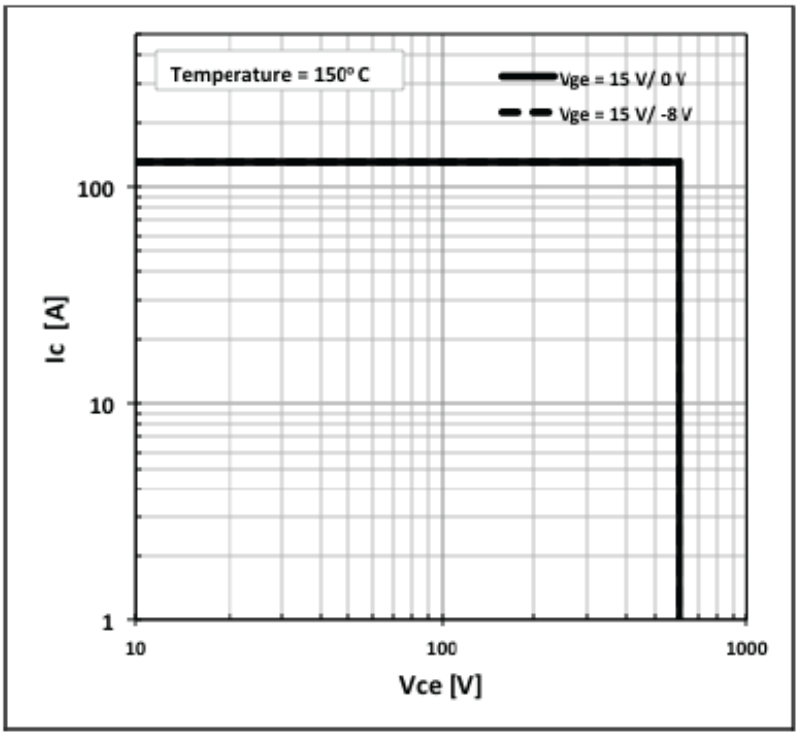


Figure 8: Turn-Off SOA (400V Applied)

Typical Operating Characteristics

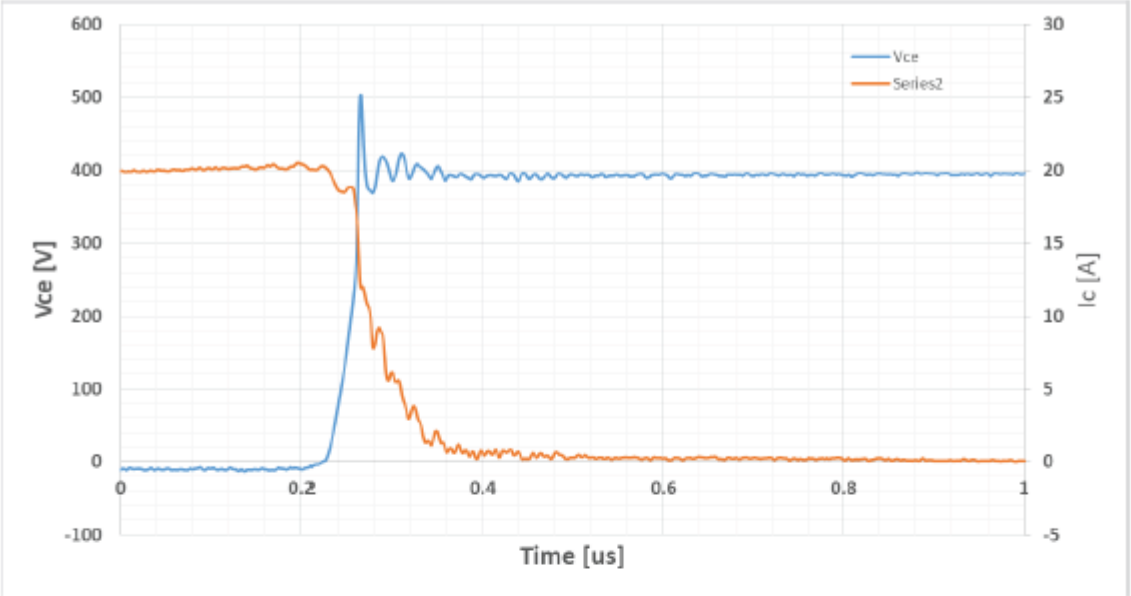


Figure 9: Turn OFF Waveform (V_{GE} = 15V/0V, R_G=6Ω, T=25°C)

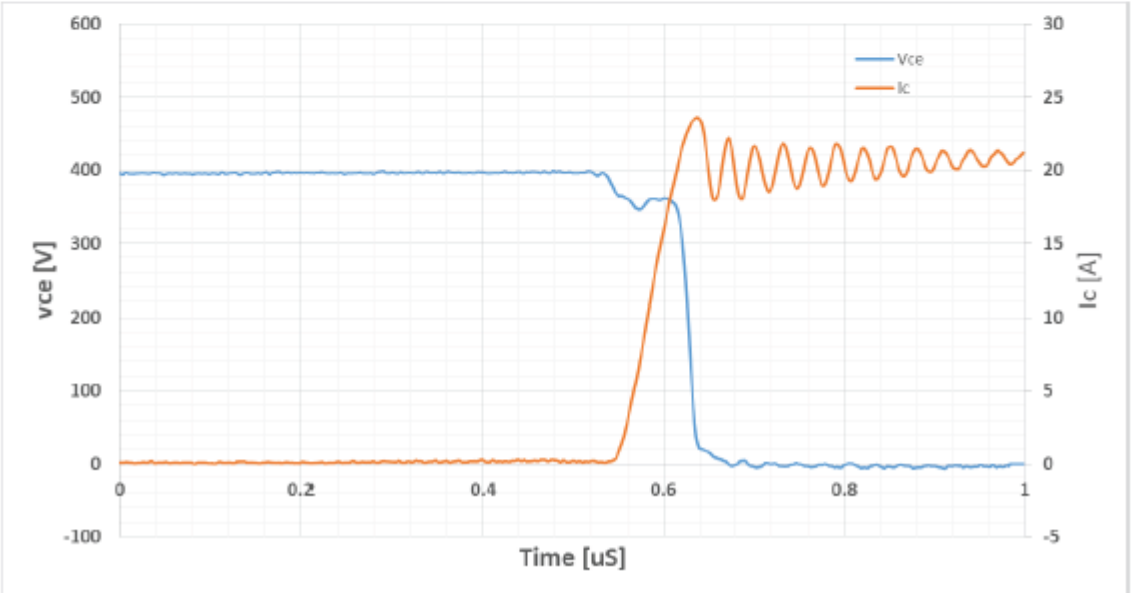


Figure 10: Turn ON Waveform (V_{GE} = 15V/0V, R_G=6Ω, T=25°C)

Typical Operating Characteristics

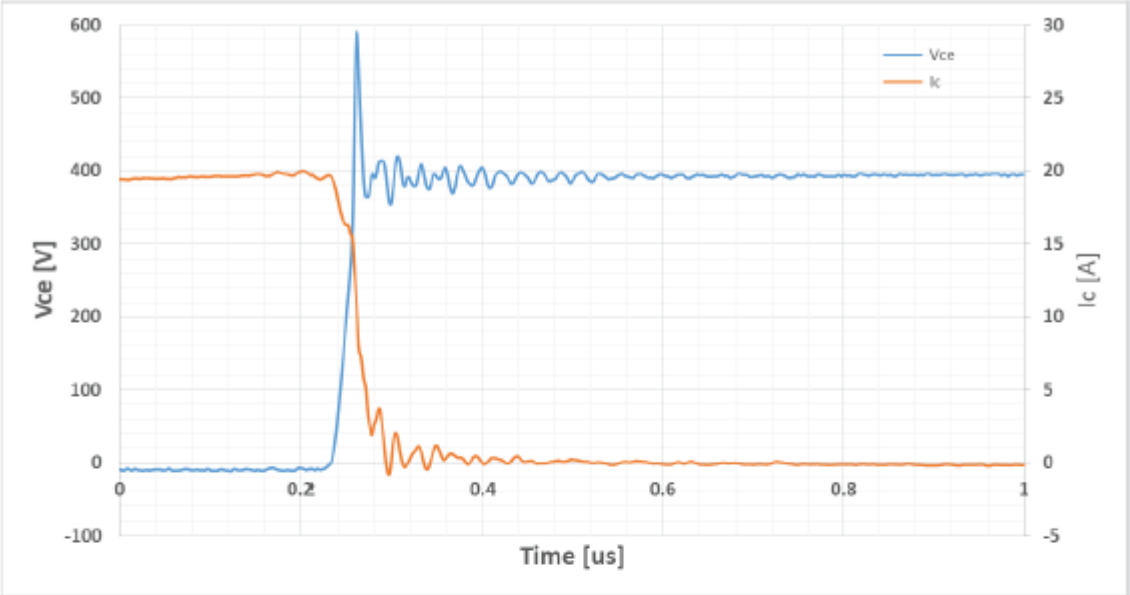


Figure 11: Turn OFF Waveform (V_{GE} = 15V/-8V, R_G=6Ω, T=25°C)

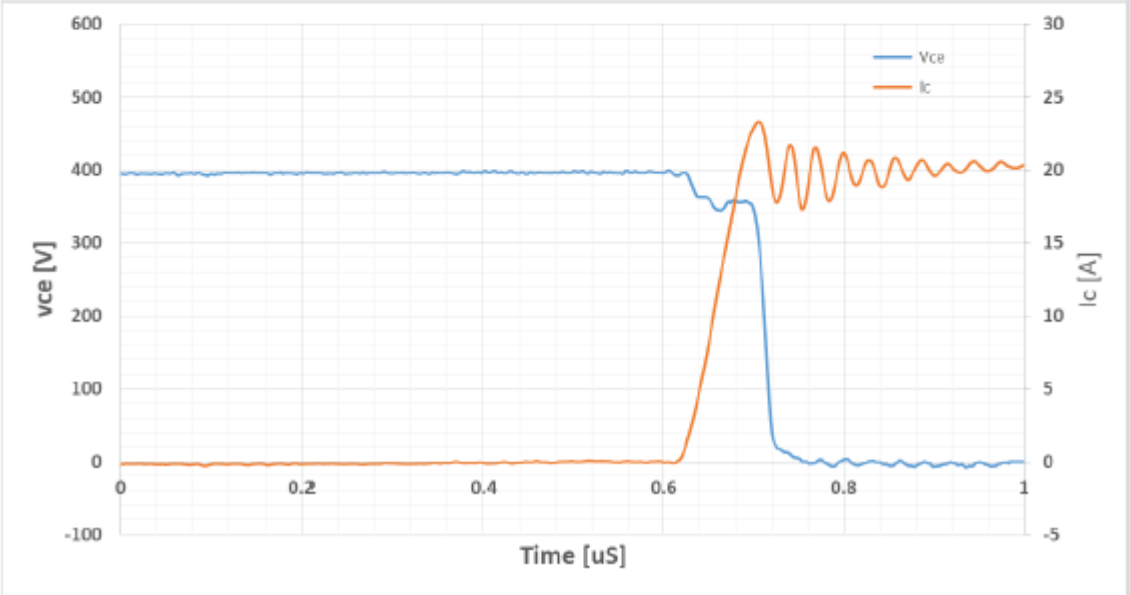
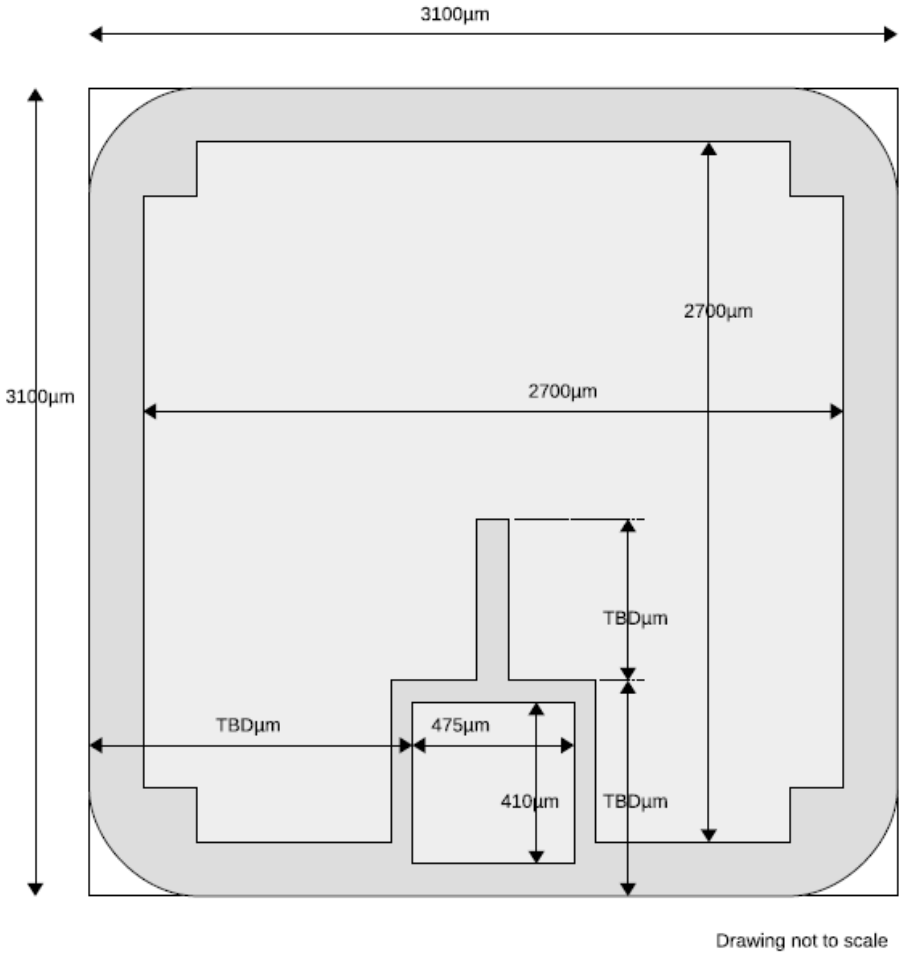


Figure 12: Turn ON Waveform (V_{GE} = 15V/-8V, R_G=6Ω, T=25°C)

Mechanical Parameters

Subject	Parameter	Specification	Units
Wafer	Diameter	200	mm
	Thickness	100	µm
	Maximum Possible Die	2882	
Die	X Dimension	3100	µm
	Y Dimension	3100	µm
Emitter Pad	X Dimension	2700	µm
	Y Dimension	2700	µm
Gate Pad	X Dimension	475	µm
	Y Dimension	410	µm
Frontside Passivation	Material	Oxide-Nitride	
Pad Metal	Material	AlCu	
	Thickness	4.0	µm
Backside Metal	Material	NiAg	

Die Drawing



Drawing not to scale