



Features

- ◆ECMOS's Proprietary Trench IGTO Technology
- ◆Extremely Low $V_{CE,SAT}$
- ◆Very 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)
- ◆Induction Heating
- ◆Motor Control

Product Summary

Current (A)	Voltage (V)	VCE,sat (V)	Package
45	600	1.2	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	°C
T_{STG}	Storage Temperature	-55		150	°C

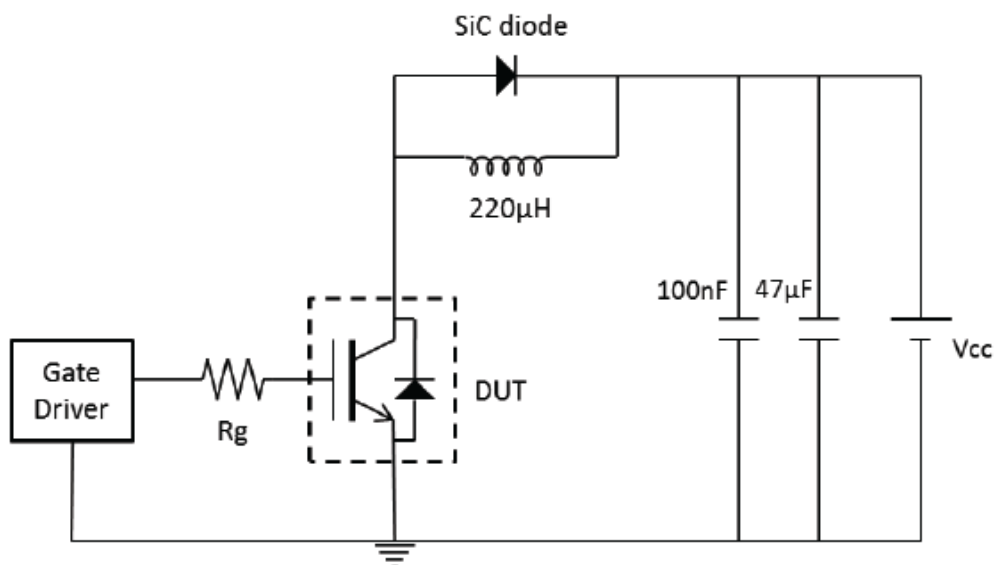
Note 1: Limited by $T_{J,MAX}$. Depends upon thermal properties of assembly.

Electrical Specifications

All specifications are tested at $T_J=25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Min	Typ	Max	Unit
$V_{BR,CES}$	Collector-to-Emitter Breakdown Voltage				
	$V_{GE}=0\text{V}, I_C=250\mu\text{A}$	600.0			V
$V_{CE,SAT}$	Collector-to-Emitter Saturation Voltage				
	$I_C=30\text{A}, V_{GE}=15\text{V}$		1.38		V
	$I_C=30\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		1.2		V
	$I_C=50\text{A}, V_{GE}=15\text{V}$		1.73		V
V_{GE}	Gate Threshold Voltage				
	$V_{CE}=V_{GE}, I_C=250\mu\text{A}$		3.8	5.4	V
I_{CES}	Collector Leakage Current				
	$V_{GE}=0\text{V}, V_{CE}=600\text{V}$		0.3	30.0	μA
	$V_{GE}=0\text{V}, V_{CE}=600\text{V}, T_J=150^\circ\text{C}$		3000.0		μA
I_{CES}	Gate Leakage Current				
	$V_{GE}=20\text{V}, V_{CE}=0\text{V}$			300.0	nA
C_{IES}	Gate Emitter Capacitance				
	$V_{GE}=0\text{V}, V_{CE}=25\text{V}, f=1\text{MHz}$		5250.0		pF
C_{OES}	Output Capacitance				
	$V_{GE}=0\text{V}, V_{CE}=25\text{V}, f=1\text{MHz}$		33.0		pF
C_{RES}	Reverse Transfer Capacitance				
	$V_{GE}=0\text{V}, V_{CE}=25\text{V}, f=1\text{MHz}$		27.0		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.

$I_C=30A$, $V_{CC}=400V$, $V_{GE}=15V$, $V_{CC}=400V$, $R_G=6\Omega$, Energy includes tail.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{d,ON}$	Turn-on Delay Time		42.0		ns
t_r	Turn-on Rise Time		43.0		ns
$t_{d,OFF}$	Turn-off Delay Time		156.0		ns
t_f	Turn-off Fall Time		85.0		ns
E_{ON}	Turn-on Switching Loss		0.39		mJ
E_{OFF}	Turn-off Switching Loss		0.54		mJ
E_{TS}	Total Switching Loss		0.93		mJ

$T_J=100^\circ C$, $I_C=30A$, $V_{CC}=400V$, $V_{GE}=15V$, $V_{CC}=400V$, $R_G=6\Omega$, Energy includes tail.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{d,ON}$	Turn-on Delay Time		42.0		ns
t_r	Turn-on Rise Time		42.0		ns
$t_{d,OFF}$	Turn-off Delay Time		237.0		ns
t_f	Turn-off Fall Time		132.0		ns
E_{ON}	Turn-on Switching Loss		0.39		mJ
E_{OFF}	Turn-off Switching Loss		1.17		mJ
E_{TS}	Total Switching Loss		1.56		mJ

$T_J=150^\circ C$, $I_C=30A$, $V_{CC}=400V$, $V_{GE}=15V$, $V_{CC}=400V$, $R_G=6\Omega$, 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		43.0		ns
$t_{d,OFF}$	Turn-off Delay Time		340.0		ns
t_f	Turn-off Fall Time		220.0		ns
E_{ON}	Turn-on Switching Loss		0.36		mJ
E_{OFF}	Turn-off Switching Loss		1.95		mJ
E_{TS}	Total Switching Loss		2.31		mJ

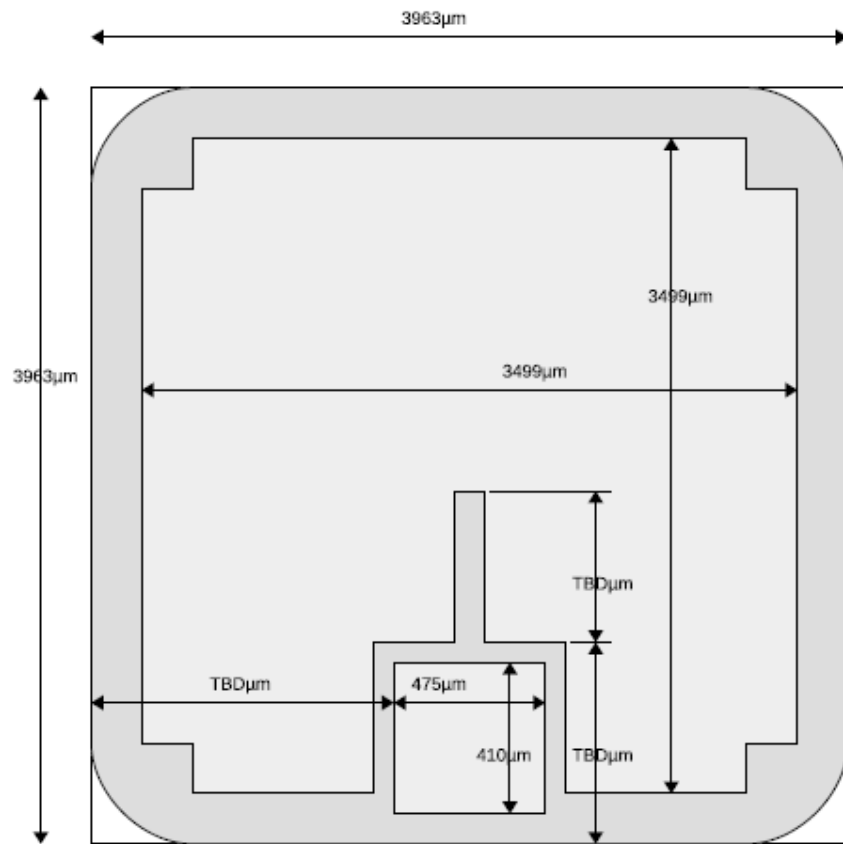
$T_J=100^\circ C$, $I_C=30A$, $V_{CC}=400V$, $V_{GE}=15V/8V$, $V_{CC}=400V$, $R_G=6\Omega$, Energy includes tail.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{d,ON}$	Turn-on Delay Time		40.0		ns
t_r	Turn-on Rise Time		43.0		ns
$t_{d,OFF}$	Turn-off Delay Time		174.0		ns
t_f	Turn-off Fall Time		88.0		ns
E_{ON}	Turn-on Switching Loss		0.36		mJ
E_{OFF}	Turn-off Switching Loss		0.84		mJ
E_{TS}	Total Switching Loss		1.2		mJ

Mechanical Parameters

Subject	Parameter	Specification	Units
Wafer	Diameter	200	mm
	Thickness	100	μm
	Maximum Possible Die	1740	
Die	X Dimension	3963	μm
	Y Dimension	3963	μm
Emitter Pad	X Dimension	3499	μm
	Y Dimension	3499	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