

Key performance:

- $V_{CE}=650V$
- $I_C=75A@T_C=100^{\circ}C$
- $V_{CE(sat)}=1.8V$

Features:

- Trench and field-stop technology.
- Easy parallel switching capability.

Benefits:

- High efficiency for inverters.
- High ruggedness performance.
- RoHS compliant.

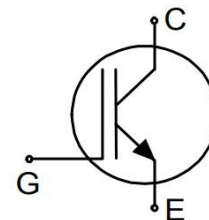
Applications:

- Hair removal device
- Flash light

Package parameters

Type	Marking	Package	Packaging Method
VSG75N65-T3	VSG75N65	TO-263	Tape and reel

TO-263



Maximum ratings

Symbol	Parameter	Values	Unit
V_{CES}	Collector-emitter voltage	650	V
V_{GES}	Gate-emitter voltage	± 20	V
I_C	Continuous collector current ($T_C=25^{\circ}\text{C}$)	125	A
	Continuous collector current ($T_C=100^{\circ}\text{C}$)	75	A
I_{CM}	Pulsed collector current, t_p limited by T_{vjmax}	300	A
P_{tot}	Power dissipation ($T_C=25^{\circ}\text{C}$)	600	W
	Power dissipation ($T_C=100^{\circ}\text{C}$)	300	W
T_{vj}	Operating junction temperature range	-40 to +175	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-55 to +150	$^{\circ}\text{C}$

Thermal characteristics

Symbol	Parameter	Values		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Thermal resistance, junction to case for IGBT	-	0.25	K/ W
$R_{th(j-a)}$	Thermal resistance, junction to ambient	-	40	K/ W

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

Static characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
BV_{CES}	Collector-emitterbreakdown voltage	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
I_{CES}	Collector-emitter leakage current	$V_{CE}=650V, V_{GE}=0V$	-	-	50	μA
I_{GES}	Gate leakage current, forward	$V_{GE}=20V, V_{CE}=0V$	-	-	100	nA
	Gate leakage current, reverse	$V_{GE}=-20V, V_{CE}=0V$	-	-	-100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$V_{GE}=V_{CE}, I_C=1mA$	5.0	5.4	5.6	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_{GE}=15V, I_C=75A$	-	1.8	-	V
		$V_{GE}=15V, I_C=75A, T_{vj}=175^{\circ}\text{C}$	-	2.3	-	V

Dynamic characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
C_{ies}	Input capacitance	$V_{CE}=30V$ $V_{GE}=0V$ $f=1MHz$	-	4250	-	pF
C_{oes}	Output capacitance		-	205	-	pF
C_{res}	Reverse transfer capacitance		-	31	-	pF
Q_g	Total gate charge	$V_{CC}=520V$ $V_{GE}=15V$ $I_C=75A$	-	130	-	nC

Switching characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-on delay time	$V_{CC}=400V$ $V_{GE}=0/15V$ $I_C=75A$ $R_G=10\Omega$ Inductive load	-	53	-	ns
t_r	Rise time		-	132	-	ns
$t_{d(off)}$	Turn-off delay time		-	162	-	ns
t_f	Fall time		-	95	-	ns
E_{on}	Turn-on energy		-	3.3	-	mJ
E_{off}	Turn-off energy		-	2.2	-	mJ
E_{ts}	Total switching energy		-	5.5	-	mJ
$t_{d(on)}$	Turn-on delay time	$V_{CC}=400V$ $V_{GE}=0/15V$ $I_C=75A$ $R_G=10\Omega$ Inductive load $T_{vj}=175^{\circ}C$	-	53	-	ns
t_r	Rise time		-	128	-	ns
$t_{d(off)}$	Turn-off delay time		-	181	-	ns
t_f	Fall time		-	107	-	ns
E_{on}	Turn-on energy		-	4.8	-	mJ
E_{off}	Turn-off energy		-	2.7	-	mJ
E_{ts}	Total switching energy		-	7.5	-	mJ

Typical performance characteristics

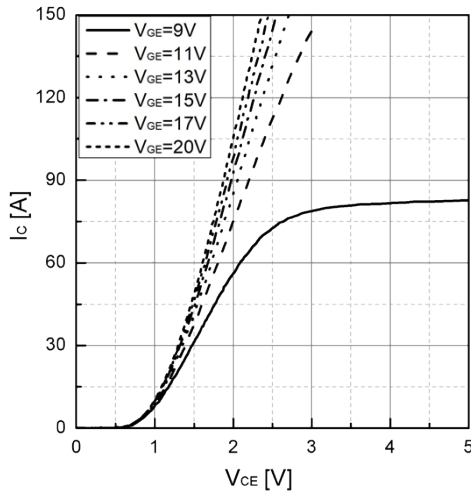


Fig 1. Typical output characteristic ($T_{vj}=25^{\circ}\text{C}$)

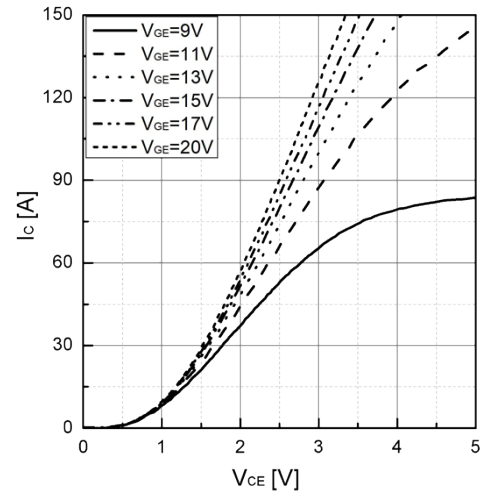


Fig 2. Typical output characteristic ($T_{vj}=175^{\circ}\text{C}$)

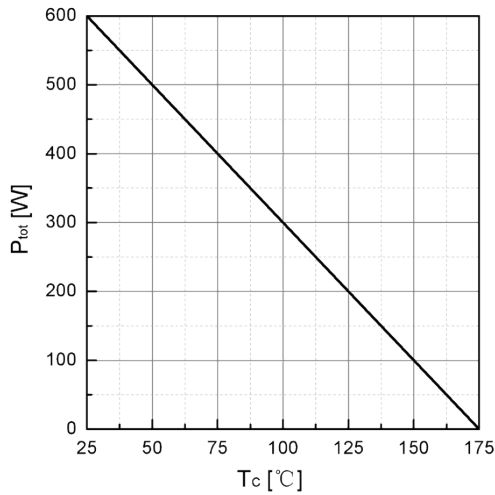


Fig 3. Power dissipation as a function of T_c

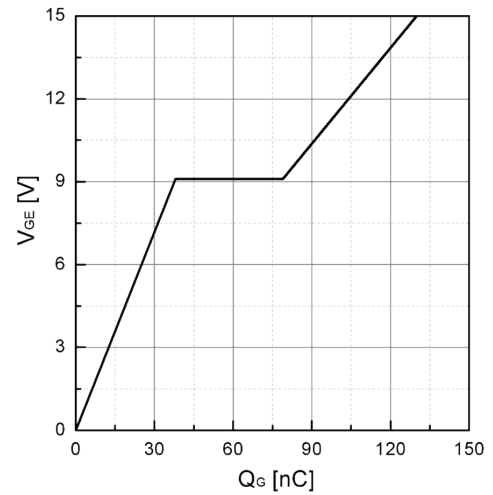


Fig 4. Typical gate charge

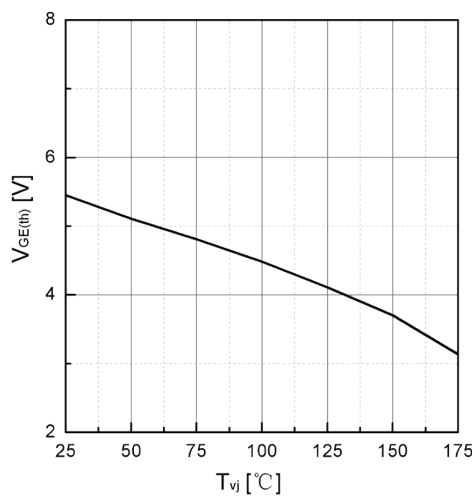


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj}
($I_c=1\text{mA}$)

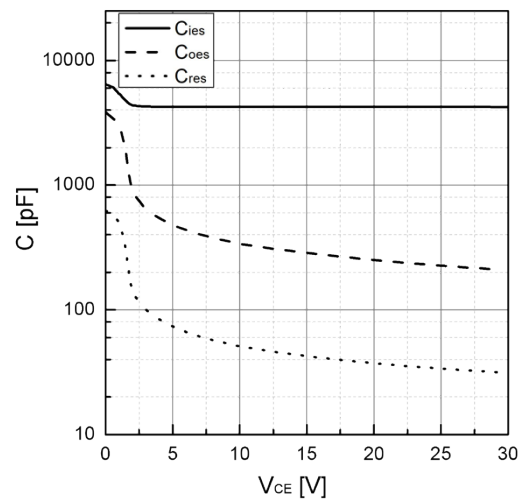


Fig 6. Typical capacitance as a function of V_{ce}
($f=1\text{Mhz}$, $V_{GE}=0\text{V}$)

Typical performance characteristics

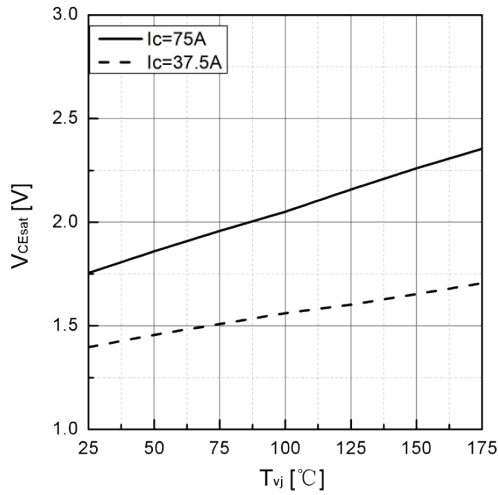


Fig 7. Typical V_{CEsat} as a function of T_{vj}

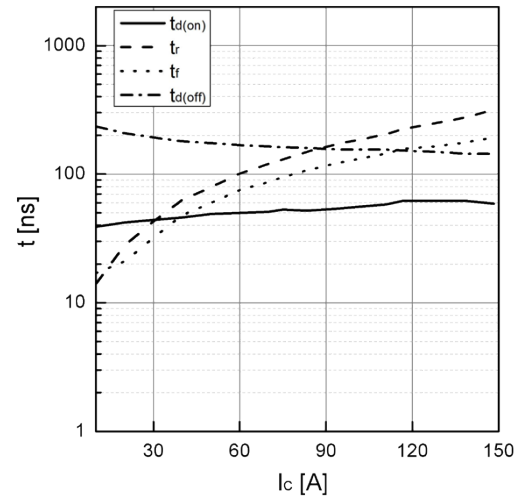


Fig 8. Typical switching time as a function of I_C

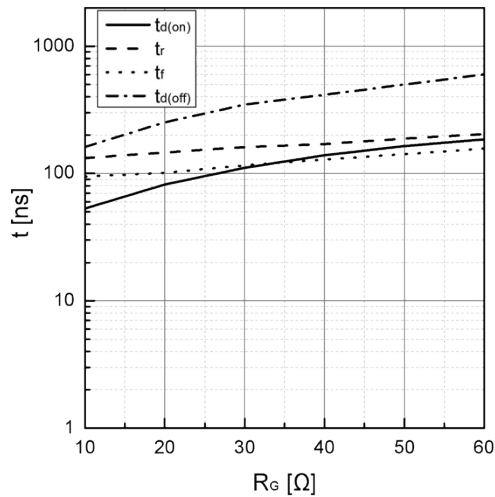


Fig 9. Typical switching times as a function of R_G

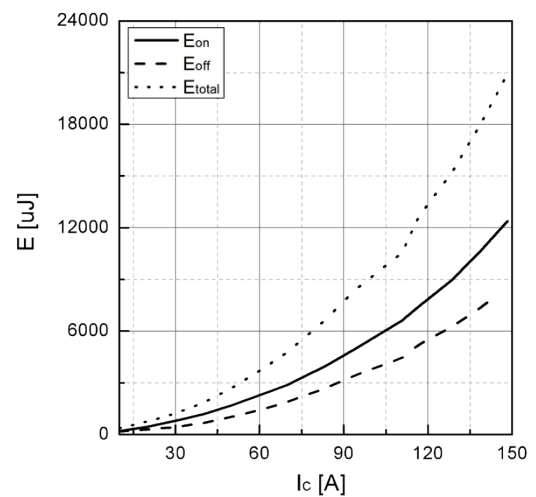


Fig 10. Typical switching energy losses as a function of I_C

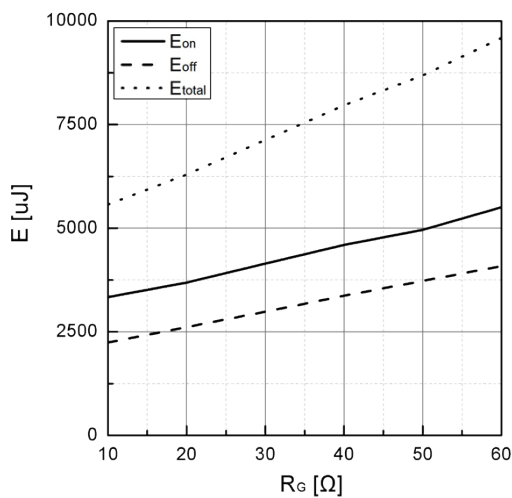


Fig 11. Typical switching energy losses as a function of R_G

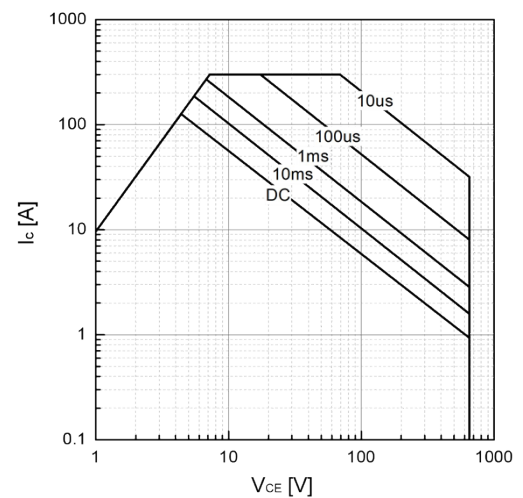


Fig 12. Safe operating area

Typical performance characteristics

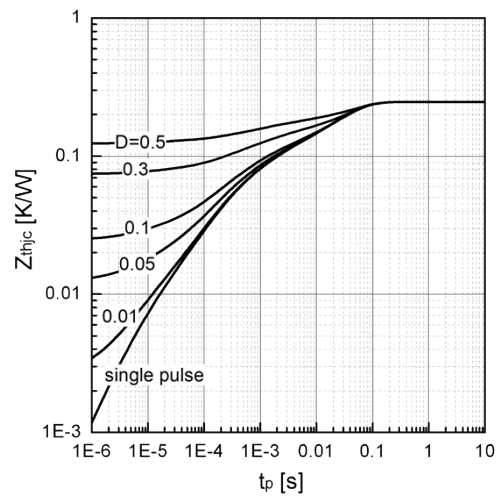


Fig 13. Transient thermal impedance, IGBT