PWG60N65YD

IGBT 650V, 1.6V, 60A

重庆平伟实业股份有限公司

Features

- 650V Trench field-stop technology
- Low conduction and switching losses
- Positive temperature coefficient of forward voltage
- Short Circuit withstand time-10μs
- Qualified according to JEDEC criteria

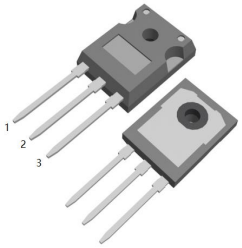
Applications

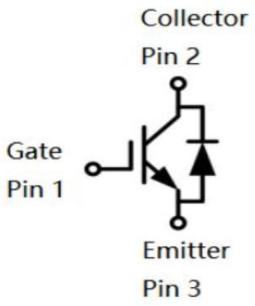
- Solar Inverter, UPS, Welder, Telecom, ESS

Product Summary

V_{CE}	650V
$V_{CE(sat)}$	1.6V
I_C	60A

TO-247-3L





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
PWG60N65YD	PWG60N65YD	TO-247-3L	Tube	N/A	N/A	30pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CES}	650	V
Collector current T_C=25°C T_C=100°C	I_C	 120 60	A
Diode forward current T_C=25°C T_C=100°C	I_F	 120 60	A
Pulsed collector current,t_p limited by T_{vjmax}	$I_{C\ pulse}$	240	A
Gate-emitter voltage	V_{GE}	±30	V
Short circuit withstand time V_{GE}=15V,V_{CC}≤400V,Allowed number of short circuits<1000,Time between short circuits≥1.0s,T_{vj}≤175°C	t_{SC}	10	us
Power dissipation T_C=25°C	P_{tot}	 305	W
Operating junction and storage temperature	T_{vj} , T_{stg}	-55...+175	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	Tsold	260	°C

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction–case.(IGBT)	R_{thJC}	-	-	0.49	°C/W	-
Thermal resistance, junction–case.(Diode)	R_{thJC}	-	-	0.63	°C/W	-
Thermal resistance, junction-ambient	R_{thJA}	-	-	62	°C/W	-

Electrical Characteristic (at T_{vj}=25°C,unless otherwise specified)

Parameter	**Symbol**	**Value**			**Unit**	**Test Condition**
		min.	**typ.**	**max.**		
Static Characteristic						
Collector-emitter breakdown voltage	BV_{CES}	650	-	-	V	V_{GE}=0V,I_C=250uA
Gate threshold voltage	$V_{GE(th)}$	4.7	-	6.2	V	V_{CE}=V_{GE},I_C=1mA
Zero gate voltage collector current	I_{CES}	- -	- -	4 1000	μA	V_{CE}=650V,V_{GE}=0V T_{vj}=25°C T_{vj}=175°C
Gate-emitter leakage current	I_{GES}	-	-	±200	nA	V_{GE}=±30V,V_{CE}=0V
Collector-emitter saturation voltage	$V_{CE(sat)}$	- -	1.60 2.10	1.92 -	V	V_{GE}=15V,I_C=60A T_{vj}=25°C T_{vj}=175°C
Dynamic Characteristic						
Input capacitance	C_{ies}	-	3254	-	pF	V_{GE}=0V, V_{CE}=25V, f=1MHz
Output capacitance	C_{oes}	-	174	-		
Reverse transfer capacitance	C_{res}	-	25	-		
Gate total charge	Q_G	-	118	-	nC	V_{CE}=520V,I_C=60A ,V_{GE}=15V
Gate-collector charge	Q_{gc}	-	48	-		
Gate-emitter charge	Q_{ge}	-	37	-		
Short circuit collector	I_{SC}	-	250.0	-	A	V_{GE}=15.0V,V_{CC}≤ 400V,t_{SC}≤10us,1000 short circuits,Times between short circuits: ≥1.0s,T_{vj}≤175°C

Switching Characteristic, Inductive Load

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
IGBT Characteristic,at T_{vj}=25°C						
Turn-on delay time	$t_{d(on)}$	-	38	-	ns	I_C=60A, V_{CE}=400V, V_{GE}=15V, R_G=10Ω, T_{vj}=25°C, Inductive load
Rise time	t_r	-	61	-		
Turn-off delay time	$t_{d(off)}$	-	118	-		
Fall time	t_f	-	115	-		
Turn-on energy	E_{on}	-	1.82	-	mJ	
Turn-off energy	E_{off}	-	1.58	-		
Total switching energy	E_{ts}	-	3.40	-		

Switching Characteristic, Inductive Load

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
IGBT Characteristic, at T_{vj}=175°C						
Turn-on delay time	$t_{d(on)}$	-	63	-	ns	I_C=60A, V_{CC}=400V, V_{GE}=15V, R_G=10Ω, T_{vj}=175°C, Inductive load
Rise time	t_r	-	101	-		
Turn-off delay time	$t_{d(off)}$	-	176	-		
Fall time	t_f	-	162	-		
Turn-on energy	E_{on}	-	3.00	-	mJ	
Turn-off energy	E_{off}	-	3.51	-		
Total switching energy	E_{ts}	-	6.51	-		
ELECTRICAL CHARACTERISTICS OF THE DIODE, at T_{vj}=25°C						
Diode forward voltage	V_F	-	1.51	1.85	V	I_F=60A
Reverse recovery time	T_{rr}	-	45	55	ns	I_F=60A, dI_F/d_t=200A/us
Reverse recovery charge	Q_{rr}	-	85	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

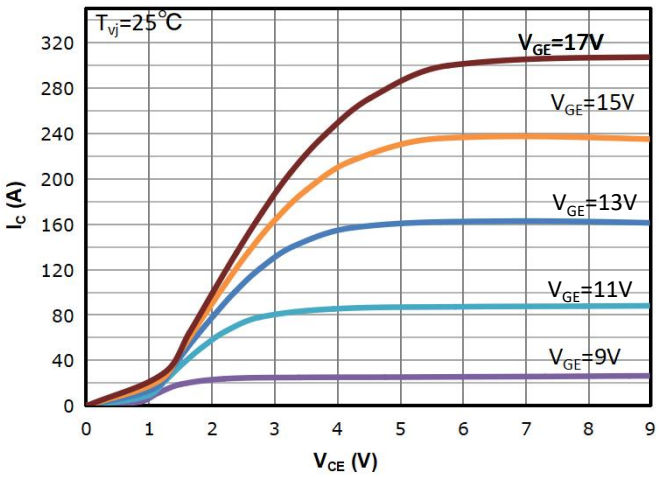


Fig 2: Output Characteristics

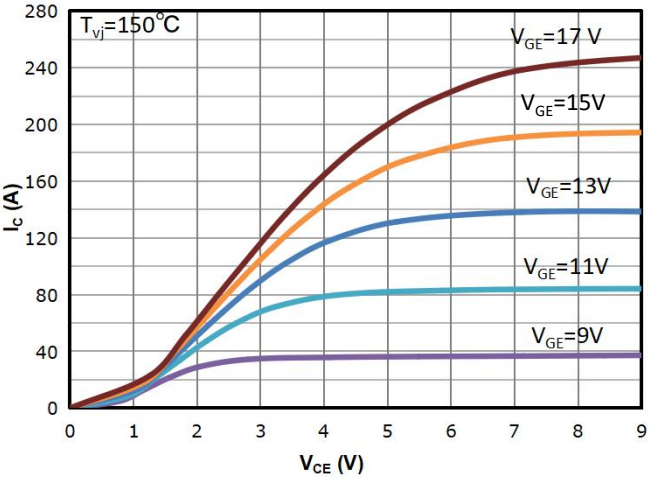


Fig 3: Transfer Characteristics

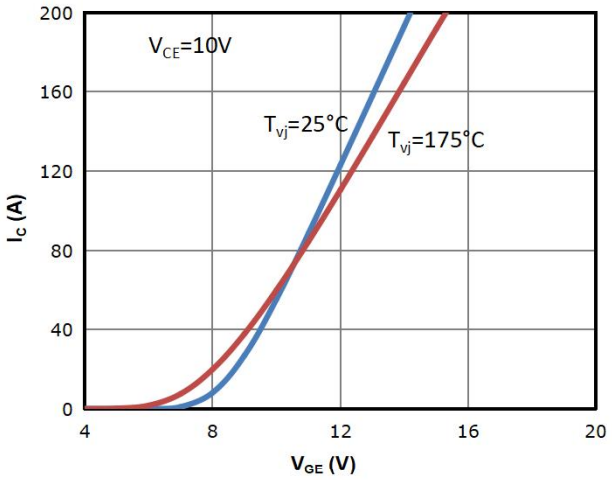


Fig 4: Typical Saturation Voltage Characteristic

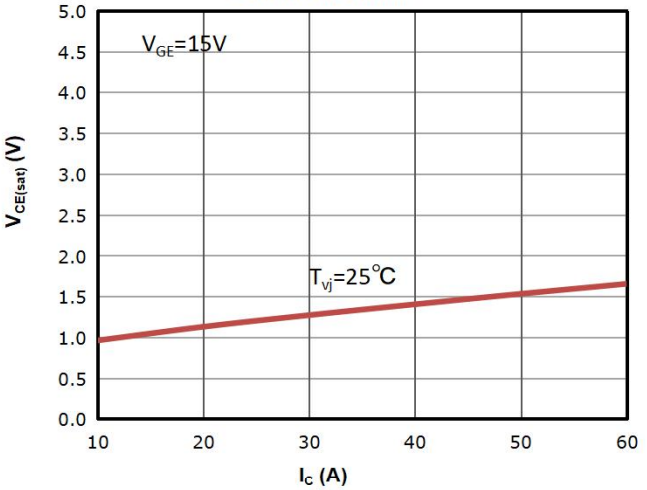


Fig 5: $V_{CE(sat)}$ vs.Gate Voltage

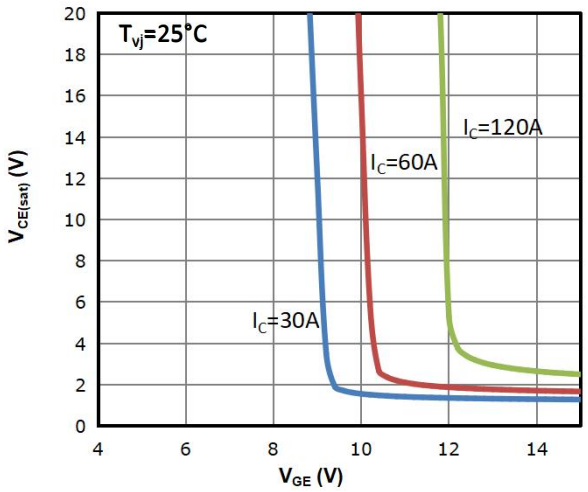


Fig 6: $V_{CE(sat)}$ vs. Temperature

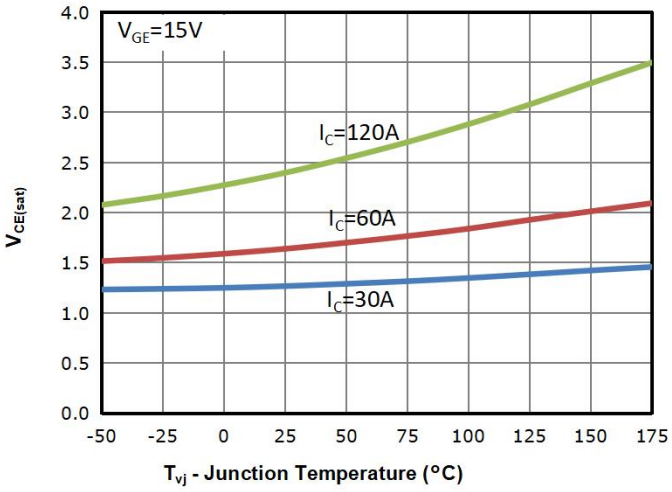


Fig 7: $V_{GE(th)}$ vs. Temperature

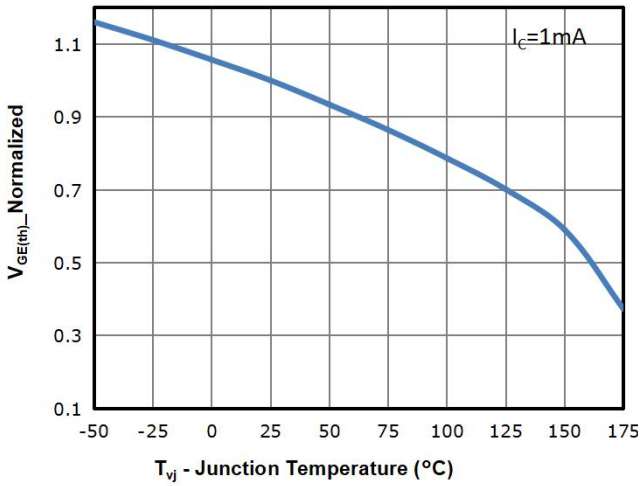


Fig 8: BVces vs. Temperature

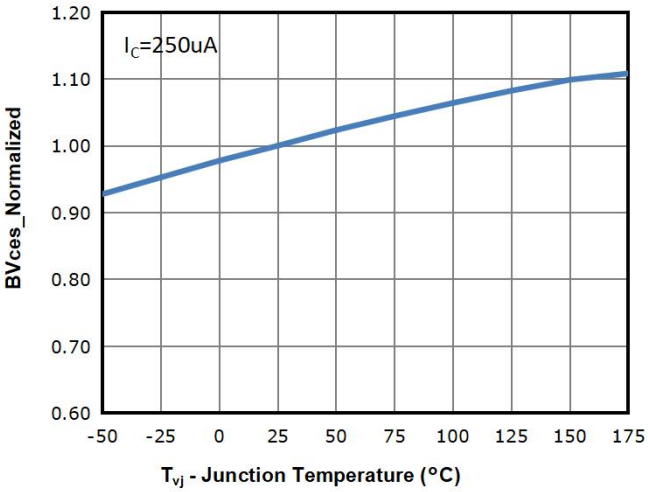


Fig 9: Forward characteristic

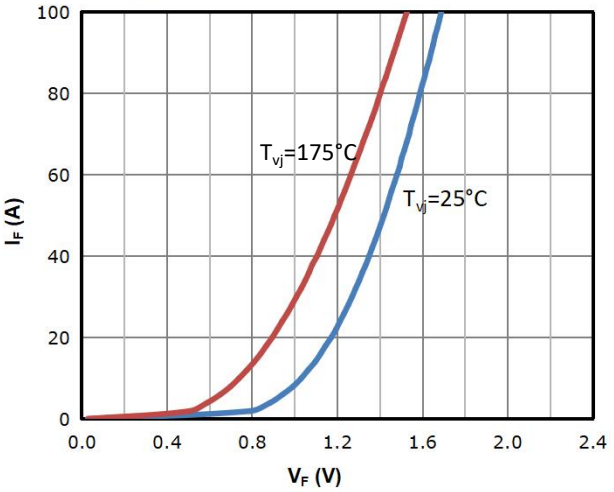


Fig 10: V_F vs. Temperature

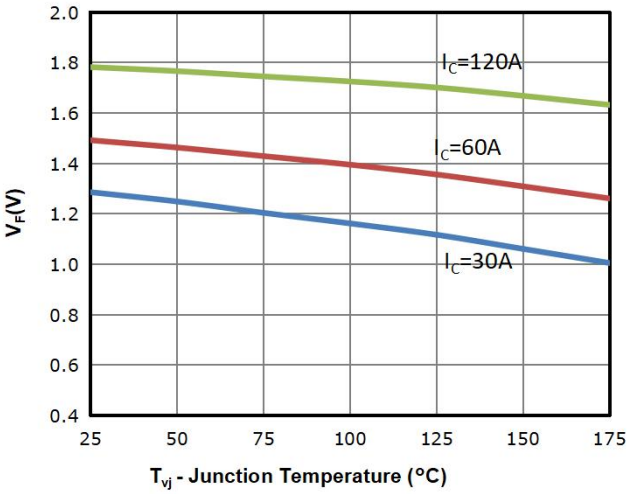


Fig 11: Capacitance Characteristics

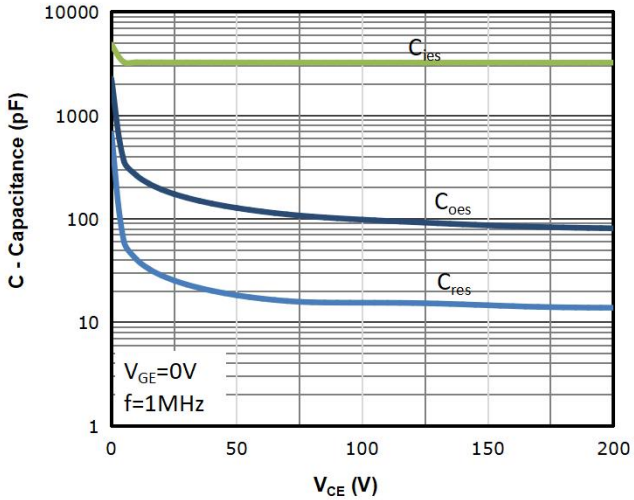


Fig 12: Gate ChargeCharacteristics

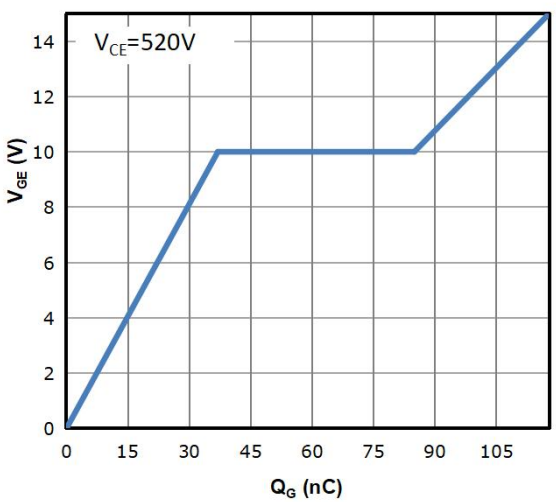


Fig 13: Typical Switching Time vs. R_G

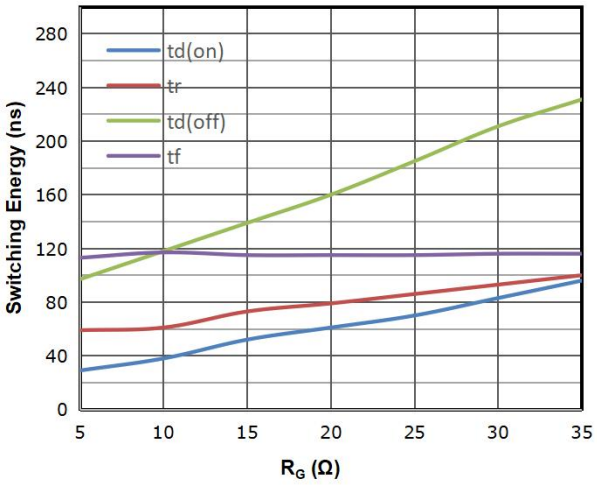


Fig 14: Typical Switching Energy vs. R_G

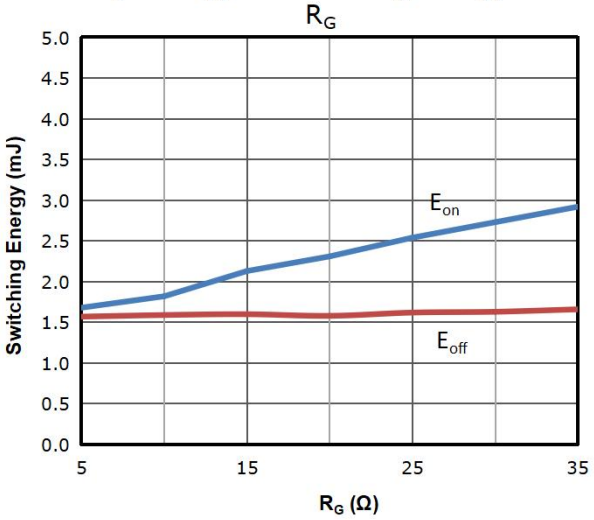


Fig 15: IGBT Max. Transient Thermal Impedance

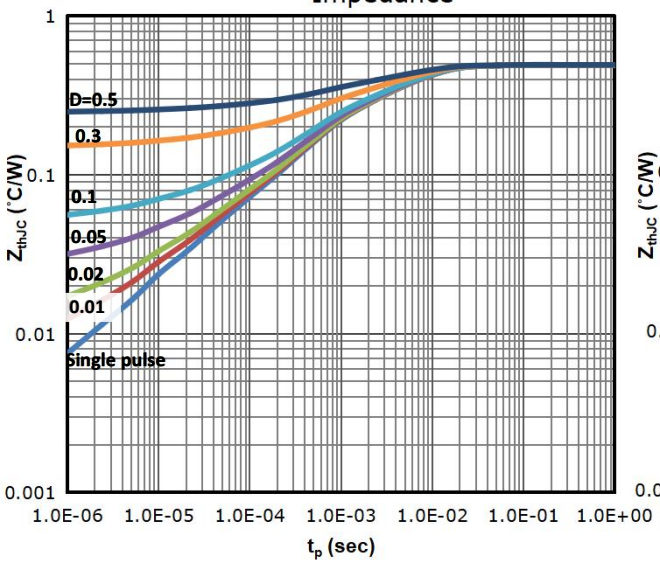


Fig 16: Diode Max. Transient Thermal Impedance

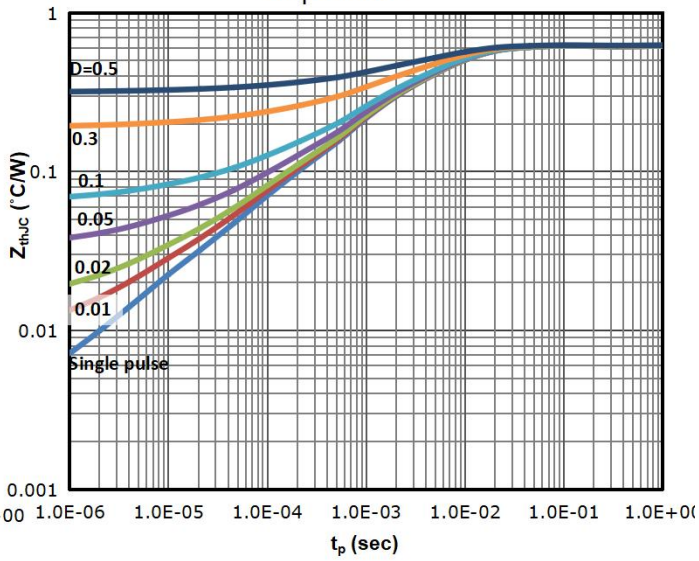
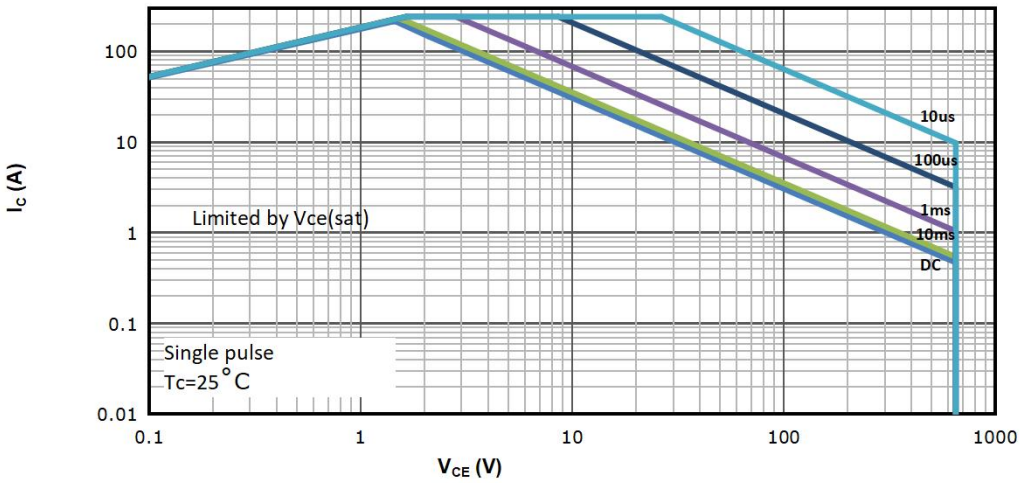
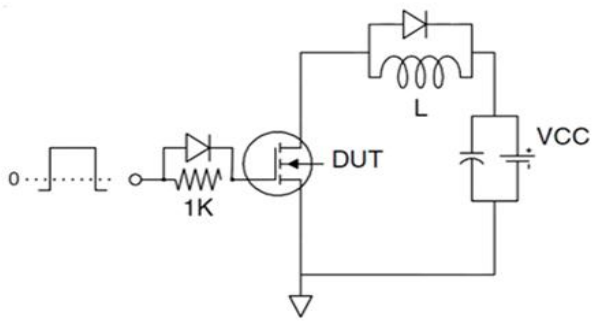


Fig 17: Safe Operating Area

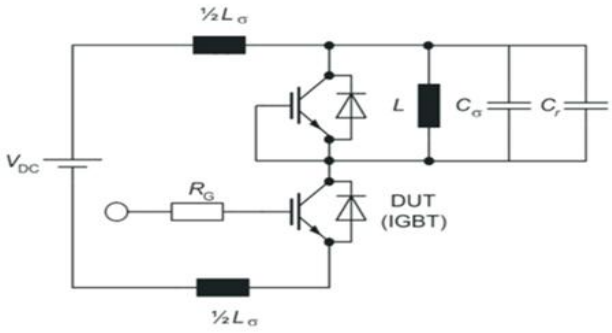


Test Circuit

1) Gate Charge Test Circuit

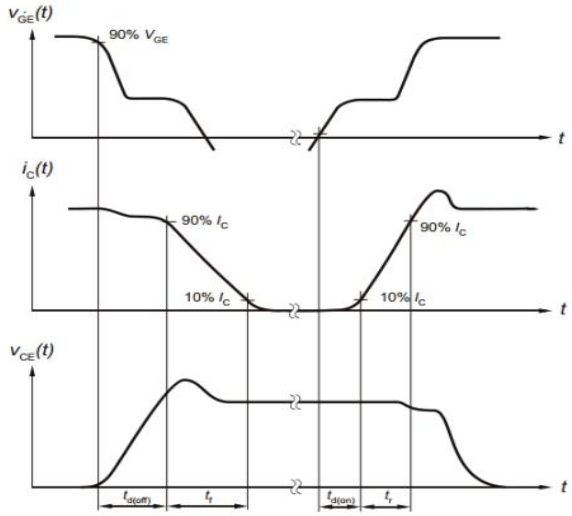


2) Switch Time Test Circuit

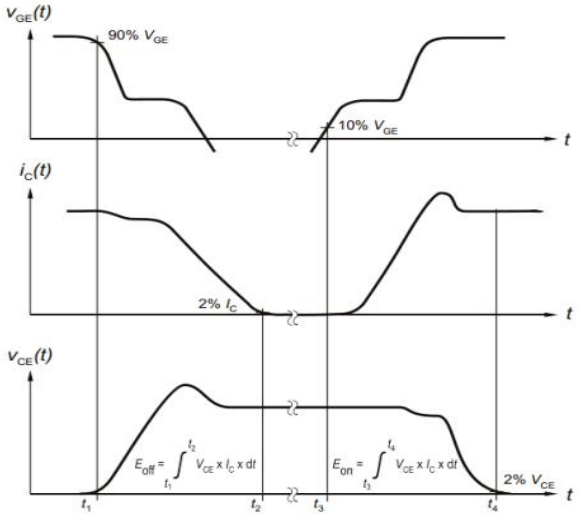


Switching characteristics

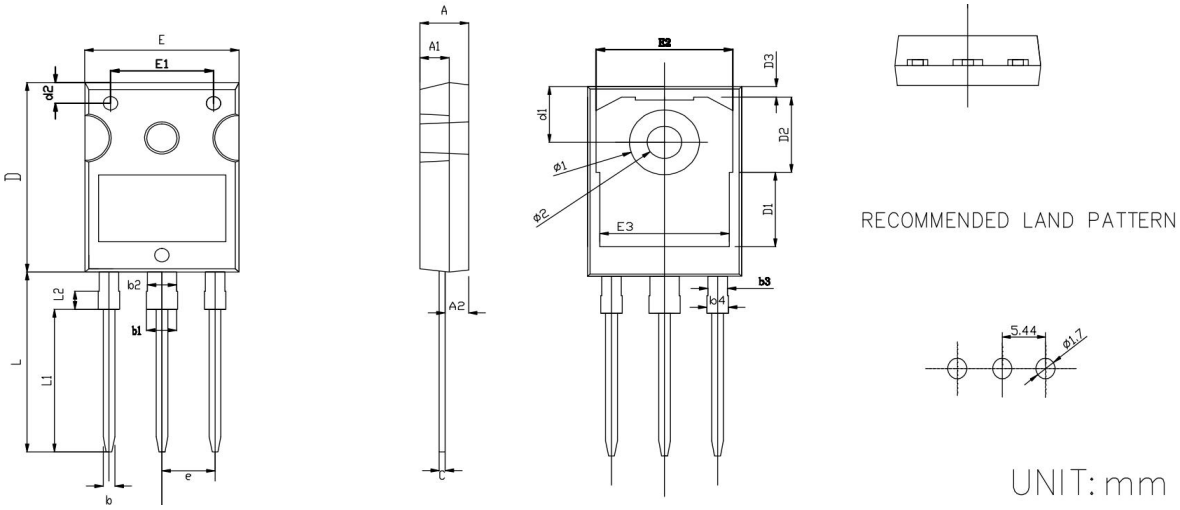
1) Definition of switching times



2) Definition of switching losses



Package Outline: TO-247-3L



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.20	0.189	0.205
A1	2.80	3.20	0.110	0.126
A2	2.26	2.56	0.089	0.101
b	1.10	1.30	0.043	0.051
b1	2.90	3.20	0.114	0.126
b2	2.90	3.10	0.114	0.122
b3	1.90	2.10	0.075	0.083
b4	2.00	2.20	0.079	0.087
c	0.50	0.70	0.020	0.028
D	20.80	21.20	0.819	0.835
D1	8.23		0.324	
D2	8.32		0.328	
D3	1.17		0.046	
d1	6.00	6.30	0.236	0.248
d2	2.20	2.40	0.087	0.094
E	15.60	16.00	0.614	0.630
E1	10.50		0.413	
E2	14.02		0.552	
E3	13.50		0.531	
e	5.34	5.54	0.210	0.218
L	19.72	20.12	0.776	0.792
L1	15.79		0.622	
L2	1.98		0.078	
φ1	7.10	7.30	0.280	0.287
φ2	3.50	3.70	0.138	0.146

Disclaimer

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