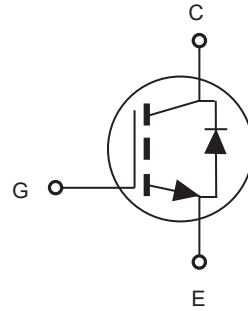
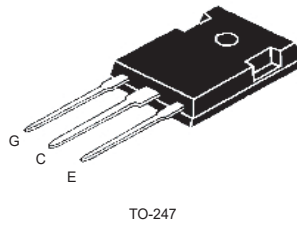


Insulated Gate Bipolar Transistor

FEATURES

- 1200V, 40A, $V_{CE(sat)(typ)} = 1.9V$ @ $V_{GE} = 15V$, $I_C = 40A$.
- Low saturation voltage.
- High power and current handling capability.
- High system efficiency
- Fast switching



ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Limit	Units
Collector-to-Emitter Breakdown Voltage	V_{CES}	1200	V
Gate-to-Emitter Voltage	V_{GE}	± 20	V
Continuous Collector Current @ $T_C = 25^\circ C$ @ $T_C = 100^\circ C$	I_C	80	A
		40	A
Pulsed Collector Current ^a	I_{CM}	160	A
Maximum Power Dissipation @ $T_C = 25^\circ C$ @ $T_C = 100^\circ C$	P_D	333	W
		166	W
Operating Junction Temperature	T_J	-40 to 175	$^\circ C$
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case for IGBT	$R_{\theta JC}$	0.45	$^\circ C/W$
Thermal Resistance, Junction-to-Case for Diode	$R_{\theta JC}$	0.7	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	40	$^\circ C/W$

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units	
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE} = 0V, I_C = 250\mu A$	1200			V	
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE} = 1200V, V_{GE} = 0V$			1	mA	
Gate Body Leakage Current, Forward	I_{GESF}	$V_{GE} = 20V, V_{CE} = 0V$			250	nA	
Gate Body Leakage Current, Reverse	I_{GESR}	$V_{GE} = -20V, V_{CE} = 0V$			-250	nA	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 250\mu A$	5		7	V	
Collector-Emitter saturation Voltage	$V_{CE(sat)}$	$V_{GE} = 15V, I_C = 40A$		1.9	2.4	V	
Input Capacitance	C_{ies}	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1MHz$		6618		pF	
Output Capacitance	C_{oes}			131		pF	
Reverse Transfer Capacitance	C_{res}			111		pF	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 40A,$ $V_{GE} = 15V, R_{GEN} = 10\Omega$ Inductive Load $T_C = 25^\circ\text{C}$		77		ns	
Turn-On Rise Time	t_r			47.5		ns	
Turn-Off Delay Time	$t_{d(off)}$			238		ns	
Turn-Off Fall Time	t_f			47		ns	
Turn-On Switching Loss	E_{on}			2.8		mJ	
Turn-Off Switching Loss	E_{off}			1.5		mJ	
Total Gate Charge	Q_g		$V_{CC} = 600V, I_C = 40A,$ $V_{GE} = 15V$		208		nC
Gate-Emitter Charge	Q_{ge}				53		nC
Gate-Collector Charge	Q_{gc}				88		nC

Electrical Characteristics of Diode $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Diode Forward Voltage	V_F	$I_F = 40A$		2.27	2.8	V
Diode Reverse Recovery Time	t_{rr}	$I_F = 40A$ $di_F / dt = 100A / \mu s$		88		ns
Diode peak Reverse Recovery Current	I_{rr}			7.6		A
Diode Reverse Recovery Charge	Q_{rr}			326		nC

Notes :

a.Repetitive Rating : Pulse width limited by maximum junction temperature .

TYPICAL PERFORMANCE CHARACTERISTICS

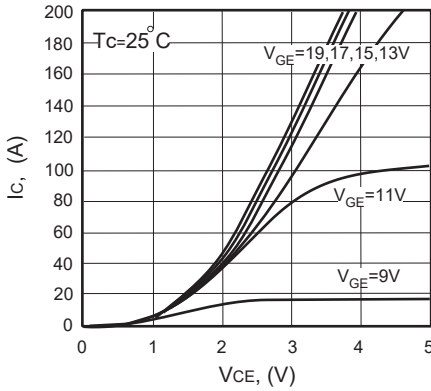


Figure 1. Output Characteristics

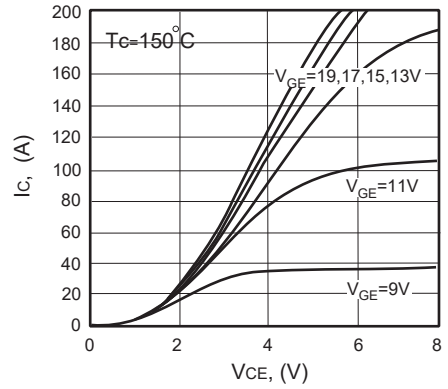


Figure 2. Output Characteristics

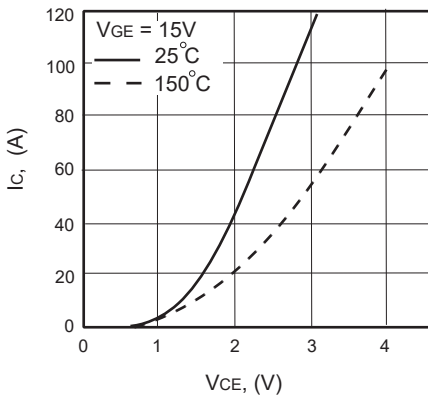


Figure 3. Saturation Voltage Characteristics

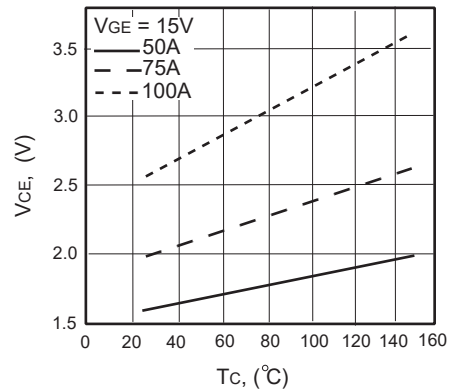


Figure 4. Saturation Voltage -Tc Characteristics

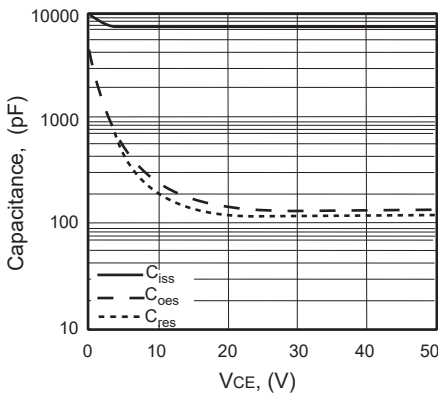


Figure 5. Capacitance Characteristics

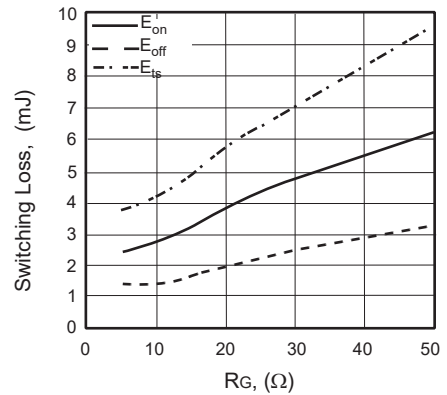


Figure 6. Switching Loss - Rg Characteristic
 $V_{CE}=600V$, $I_C=40A$, $R_G=10\ \Omega$, $V_{GE}=15V$, Inductive Load, $T_A=25^\circ C$

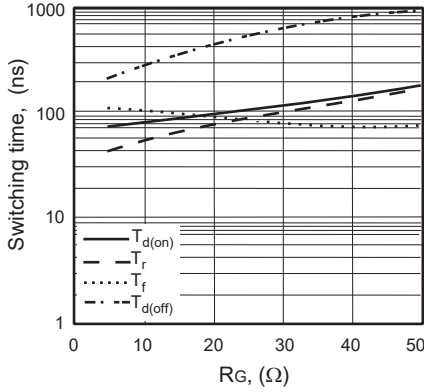


Figure 7. switching Time-Rg Characteristics

VCE=600V, IC=40A, RG=10 Ω, VGE=15V, Inductive Load, TA=25°C

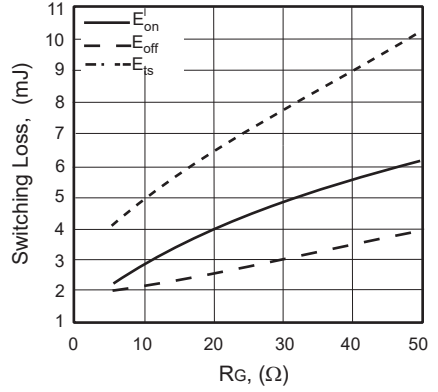


Figure 8. Switching Loss-Rg Characteristics

VCE=600V, IC=40A, RG=10 Ω, VGE=15V, Inductive Load, TA=150°C

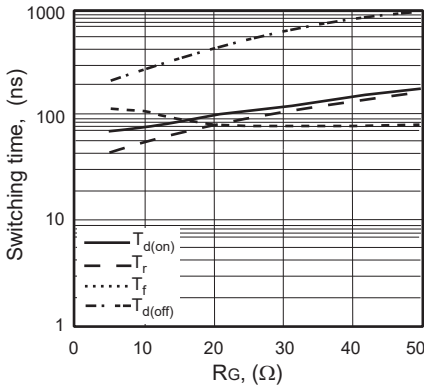


Figure 9. Switching Time-Rg Characteristics

VCE=600V, IC=40A, RG=10 Ω, VGE=15V, Inductive Load, TA=150°C

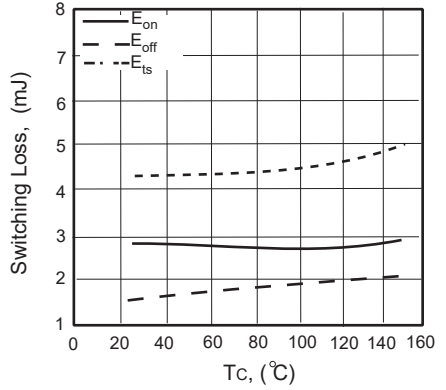


Figure 10. Switching Loss-Tc Characteristics

VCE=600V, IC=40A, RG=10 Ω, VGE=15V, Inductive Load,

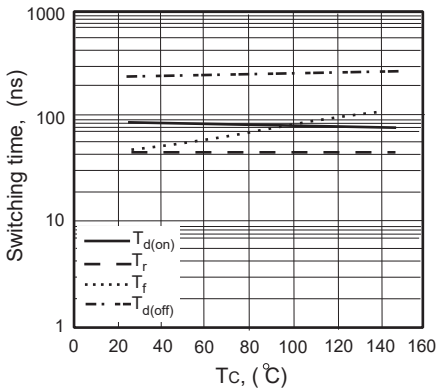


Figure 11. Switching Time-Tc Characteristics

VCE=600V, IC=40A, RG=10 Ω, VGE=15V, Inductive Load,

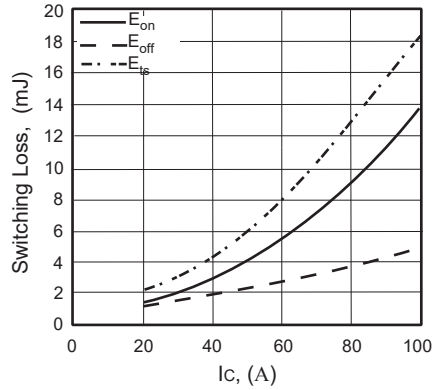


Figure 12. Switching Loss-Ic Characteristics

VCE=600V, RG=10 Ω, VGE=15V, Inductive Load, TA=25°C

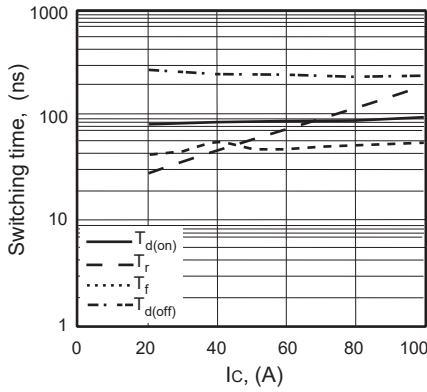


Figure 13. Switching Time- I_c Characteristics
 $V_{CE}=600V$, $R_G=10\ \Omega$, $V_{GE}=15V$, Inductive Load, $T_A=25^\circ C$

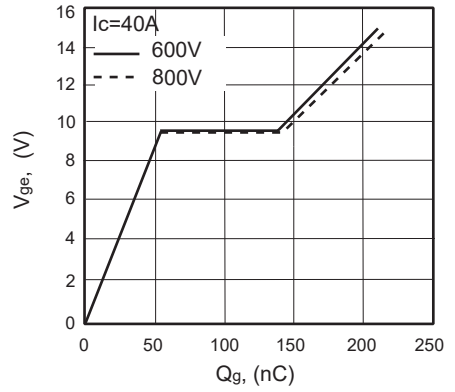


Figure 14. Gage Charge Characteristics

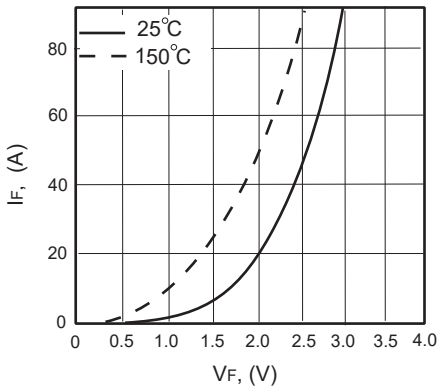


Figure 15. Diode Forward Characteristics

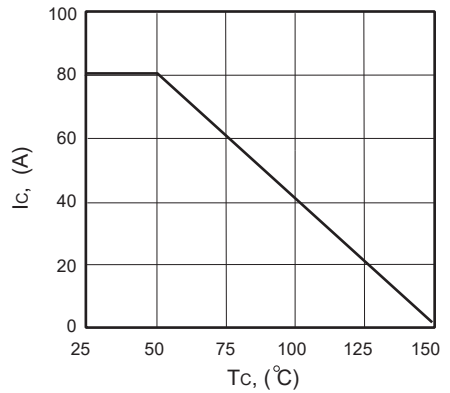


Figure 16. Collector Current- T_c Characteristics

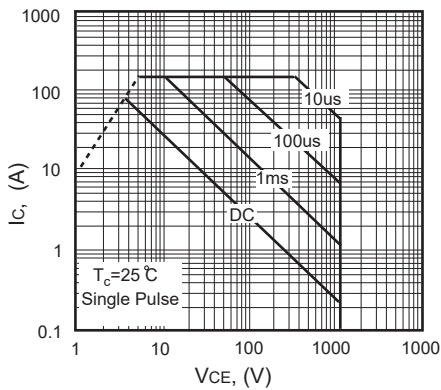
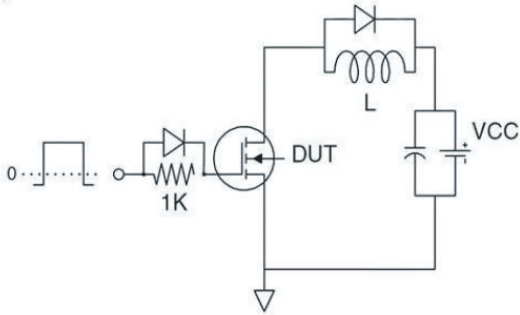
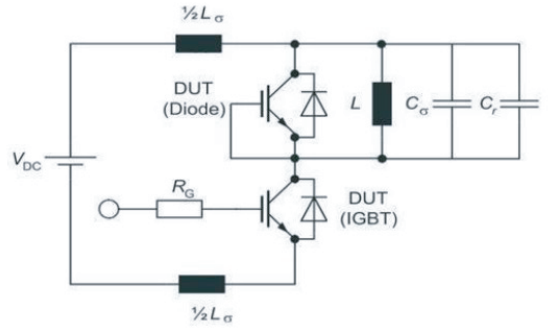


Figure 17. Forward Bias Safe Operating Area

TEST CIRCUIT

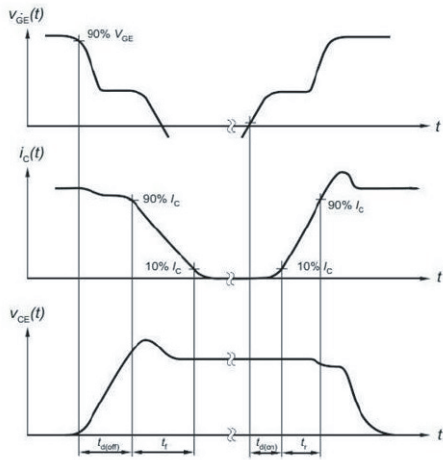


Gate Charge Test Circuit

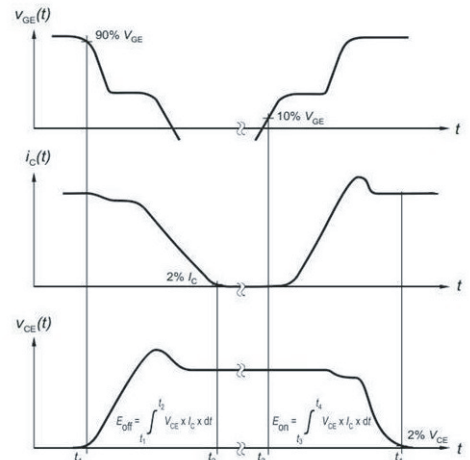


Switch Time Test Circuit

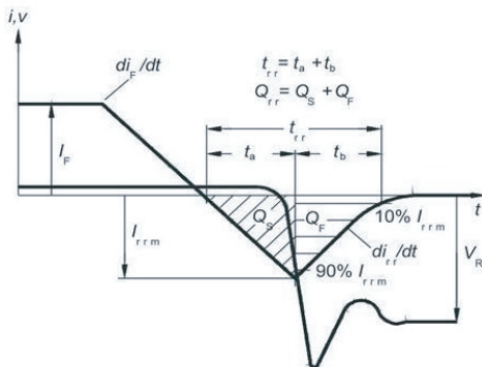
SWITCHING CHARACTERISTICS



Definition of switching times

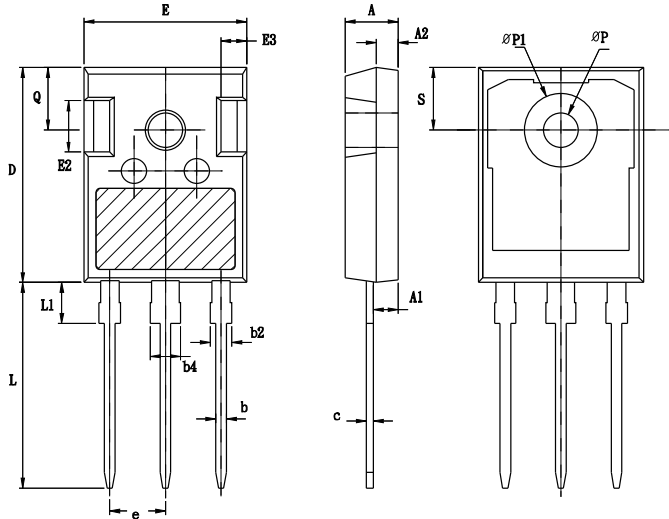


Definition of switching losses



Definition of diode switching characteristics

TO-247 產品外觀尺寸圖 (Product Outline Dimension)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.600	5.200	0.181	0.205
A1	2.200	2.600	0.087	0.102
A2	1.900	2.160	0.075	0.085
b	0.900	1.400	0.035	0.055
b2	1.750	2.150	0.069	0.085
b4	2.800	3.350	0.110	0.132
C	0.500	0.700	0.020	0.026
D	20.600	21.300	0.811	0.839
e	5.45BSC		0.215BSC	
E	15.500	16.100	0.610	0.634
E2	3.800	5.300	0.150	0.209
E3	0.80	2.60	0.031	0.102
L	19.00	20.50	0.748	0.807
L1	3.90	4.60	0.154	0.181
ΦP	3.3	3.7	0.130	0.146
ΦP1	~	7.3	~	0.287
S	6.20BSC		0.244BSC	
Q	5.20	6.0	0.205	0.236