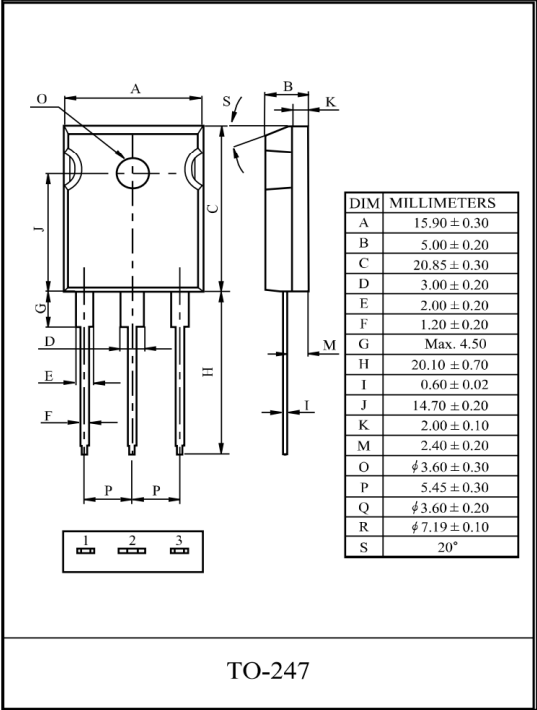


General Description

Din-Tek Field Stop Trench IGBTs offer low switching losses, high energy efficiency and short circuit ruggedness. It is designed for applications such as motor control, uninterrupted power supplies(UPS), general inverters.

FEATURES

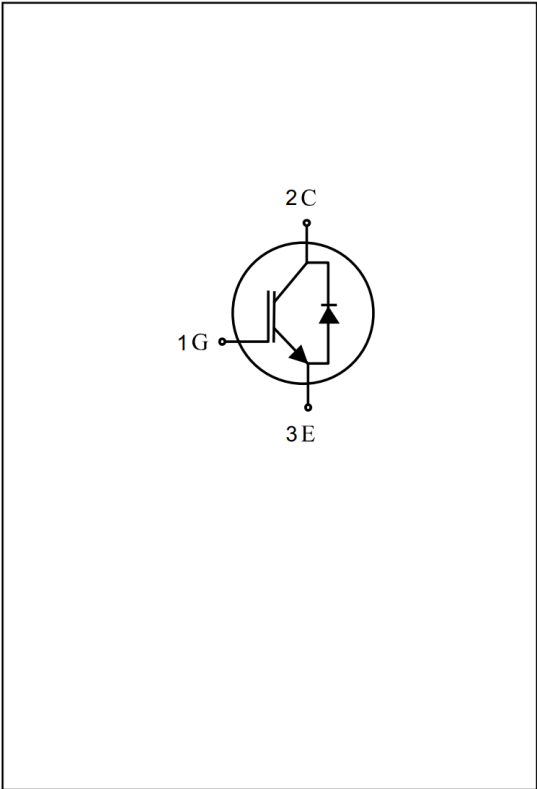
- High speed switching
- High ruggedness, temperature stable behavior
- Short Circuit Withstand Times 10us
- Extremely enhanced avalanche capability



MAXIMUM RATING (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V _{CES}	650	V
Gate-Emitter Voltage		V _{GES}	± 30	V
Collector Current	@Tc=25°C	I _C	100	A
	@Tc=100°C		80	A
Pulsed Collector Current		I _{CM} *	300	A
Diode Continuous Forward Current	@Tc=100°C	I _F	80	A
Diode Maximum Forward Current		I _{FM}	300	A
Maximum Power Dissipation	@Tc=25°C	P _D	508	W
	@Tc=100°C		255	W
Maximum Junction Temperature		T _j	150	°C
Storage Temperature Range		T _{stg}	-55 to + 150	°C

*Repetitive rating : Pulse width limited by max. junction temperature



THERMAL CHARACTERISTIC

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Junction to Case (IGBT)	R _{thJC}	0.25	°C/W
Thermal Resistance, Junction to Case (DIODE)	R _{thJC}	0.5	°C/W
Thermal Resistance, Junction to Ambient	R _{thJA}	40	°C/W

ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Static							
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V	
Collector Cut-off Current	I_{CES}	$V_{GE}=0V, V_{CE}=650V$	-	-	75	μA	
Gate Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	± 100	nA	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=0.25mA$	3.0		5.0	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=50A$	-	1.5	-	V	
		$V_{GE}=15V, I_C=100A$	-	2.05	-	V	
		$V_{GE}=15V, I_C=80A, T_C = 125^\circ C$	-	1.75	-	V	
Dynamic							
Total Gate Charge	Q_g	$V_{CC}=520V, V_{GE}=15V, I_C= 80A$	-	160	-	nC	
Gate-Emitter Charge	Q_{ge}		-	25	-	nC	
Gate-Collector Charge	Q_{gc}		-	90	-	nC	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=400V, I_C=80A, V_{GE}=15V, R_G=10\Omega$ Inductive Load, $T_C = 25^\circ C$ (Note 1)	-	18.1	-	ns	
Rise Time	t_r		-	15.6	-	ns	
Turn-Off Delay Time	$t_{d(off)}$		-	15.8	-	ns	
Fall Time	t_f		-	18.6	-	ns	
Turn-On Switching Loss	E_{on}		-	2.5	-	mJ	
Turn-Off Switching Loss	E_{off}		-	1.3	-	mJ	
Total Switching Loss	E_{ts}		-	3.9	-	mJ	
Turn-On Delay Time	$t_{d(on)}$		$V_{CC}=400V, I_C=80A, V_{GE}=15V, R_G=10\Omega$ Inductive Load, $T_C = 125^\circ C$ (Note 1)	-	17.5	-	ns
Rise Time	t_r			-	15.4	-	ns
Turn-Off Delay Time	$t_{d(off)}$			-	17.5	-	ns
Fall Time	t_f	-		20.3	-	ns	
Turn-On Switching Loss	E_{on}	-		3.5	-	mJ	
Turn-Off Switching Loss	E_{off}	-		1.6	-	mJ	
Total Switching Loss	E_{ts}	-		5.2	-	mJ	
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	-	1910	-	pF	
Output Capacitance	C_{oes}		-	127	-	pF	
Reverse Transfer Capacitance	C_{res}		-	14.6	-	pF	
Short Circuit Withstand Time	t_{sc}	$V_{CC}=300V, V_{GE}=15V, T_C=100^\circ C$	10	-	-	μs	

Note 1 : Energy loss include tail current and diode reverse recovery.

ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Diode Forward Voltage	V_F	$I_F = 80A$	$T_C = 25^\circ C$	-	1.40	-	V
			$T_C = 125^\circ C$	-	1.45	-	
Diode Reverse Recovery Time	t_{rr}		$T_C = 25^\circ C$	-	95	-	ns
			$T_C = 125^\circ C$	-	138	-	
Diode Peak Reverse Recovery Current	I_{rr}	$V_{CC} = 400V, I_F = 80A$ $di/dt = 600A/\mu s$	$T_C = 25^\circ C$	-	49	-	A
			$T_C = 125^\circ C$	-	42	-	
Diode Reverse Recovery Charge	Q_{rr}		$T_C = 25^\circ C$	-	1.1	-	μC
			$T_C = 125^\circ C$	-	2.3	-	

Fig 1. Saturation Voltage Characteristics

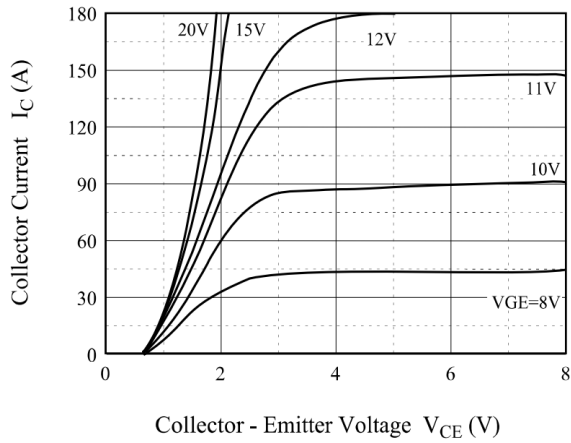


Fig 2. Saturation Voltage Characteristics

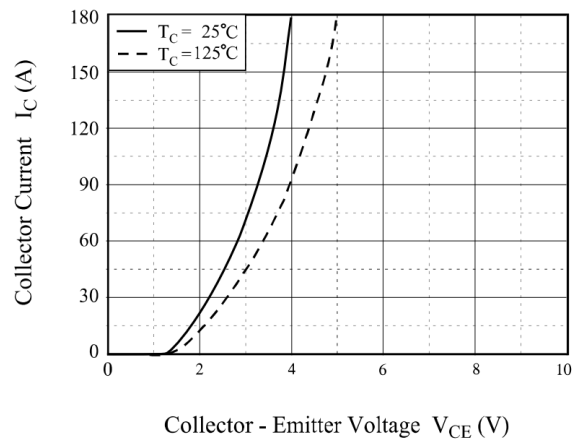


Fig 3. Saturation Voltage vs. Case Temperature

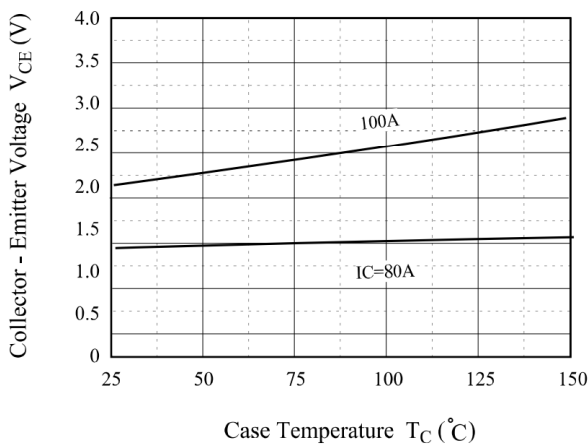


Fig 4. Saturation Voltage vs. V_{GE}

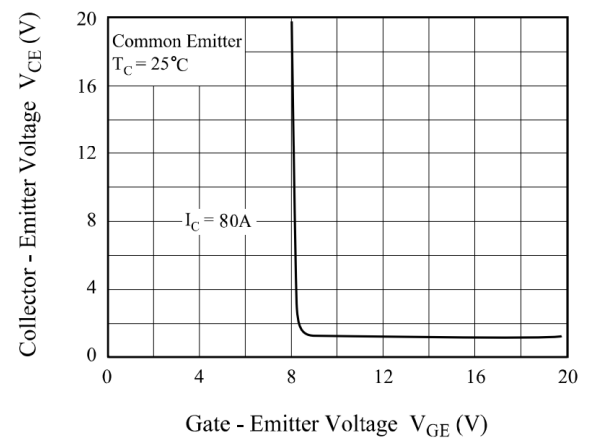


Fig 5. Saturation Voltage vs. V_{GE}

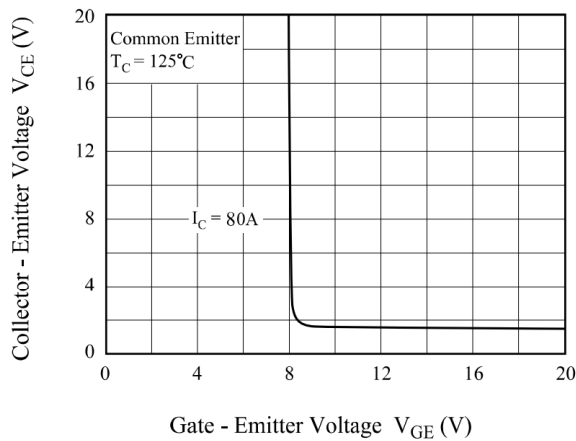


Fig 6. Capacitance Characteristics

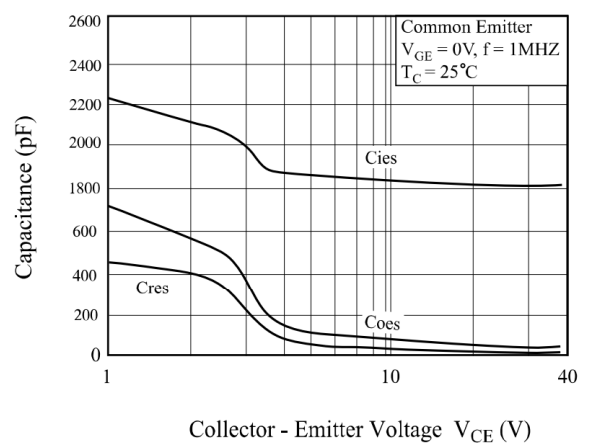


Fig 7. Turn-On Characteristics vs. Gate Resistance

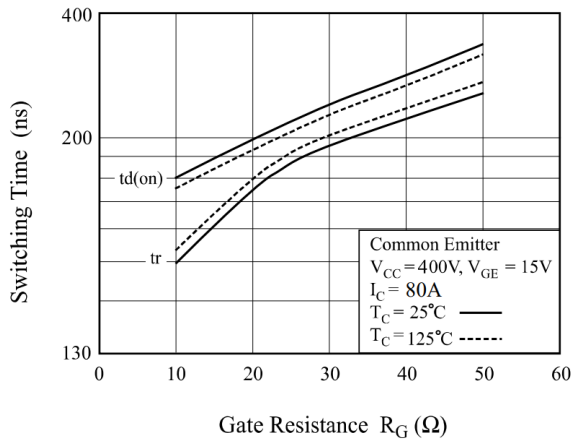


Fig 8. Turn-Off Characteristics vs. Gate Resistance

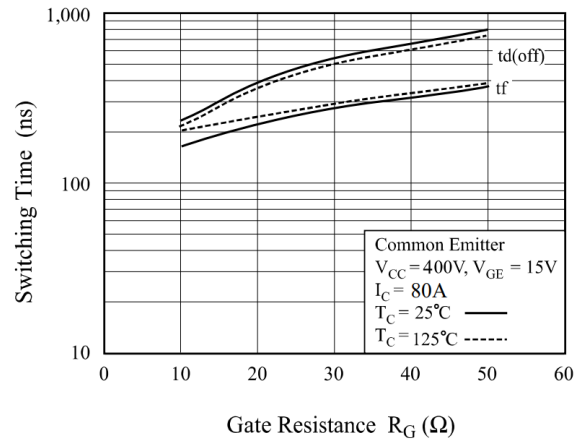


Fig 9. Switching Loss vs. Gate Resistance

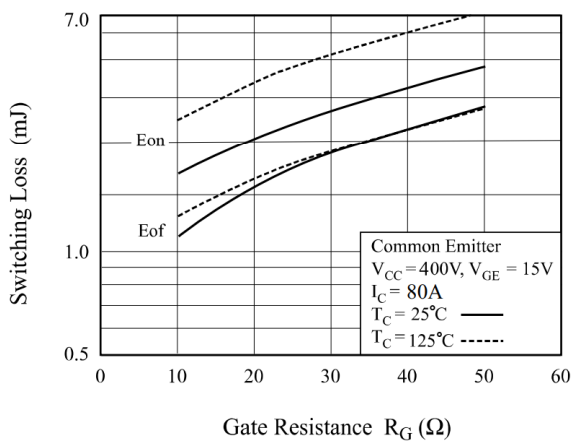


Fig 10. Turn-On Characteristics vs. Collector Current

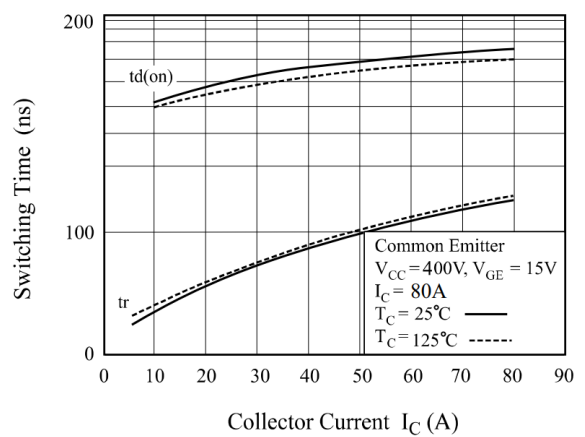


Fig 11. Turn-Off Characteristics vs. Collector Current

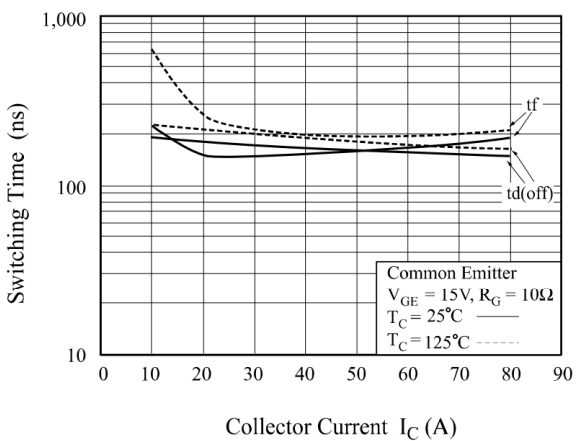


Fig 12. Switching Loss vs. Collector Current

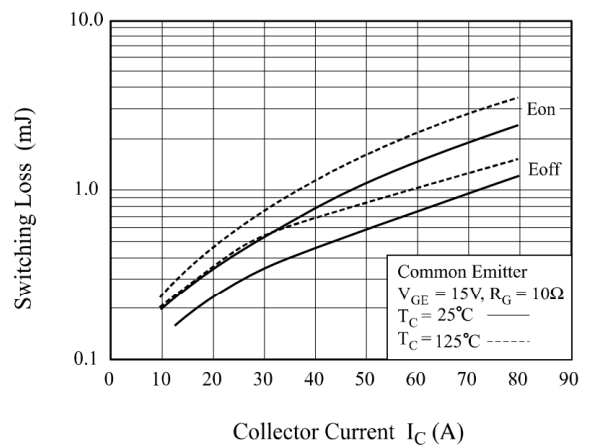


Fig 13. Gate Charge Characteristics

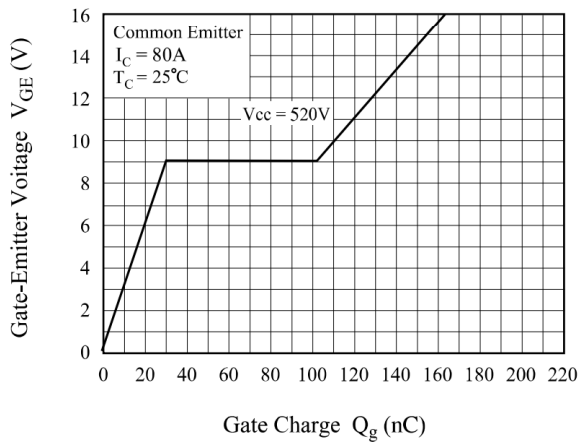


Fig 14. SOA Characteristics

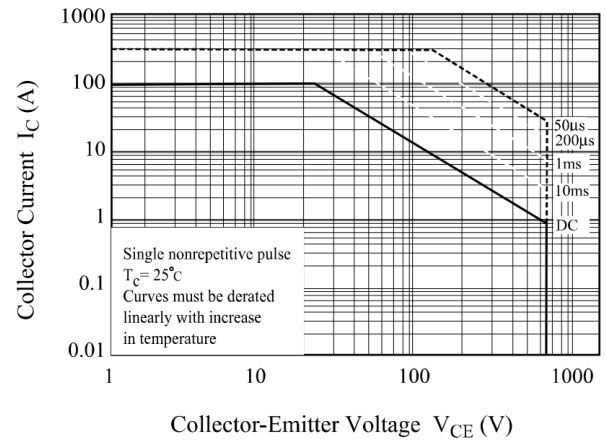


Fig 15. Transient Thermal Impedance of IGBT

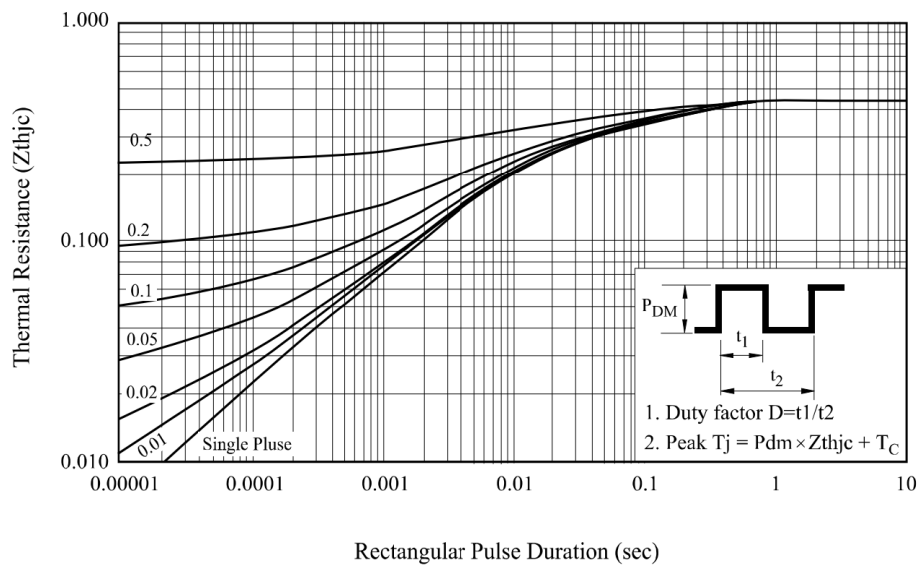


Fig 16. Forward Characteristics

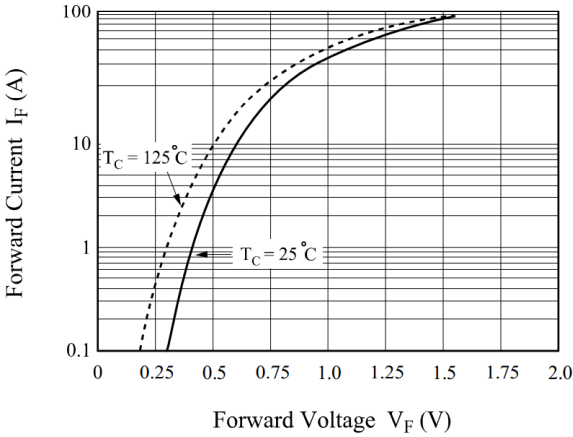


Fig 17. Reverse Recovery Current

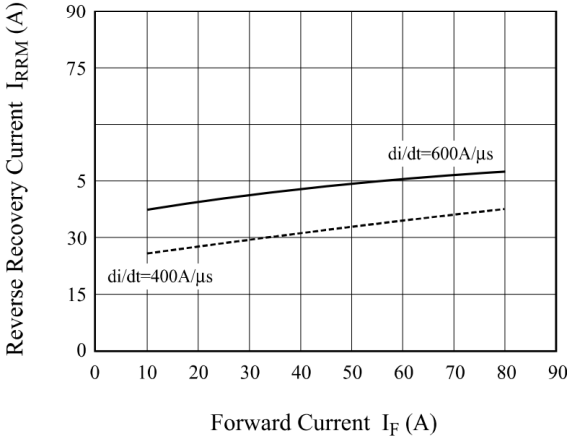


Fig 18. Reverse Recovery Time

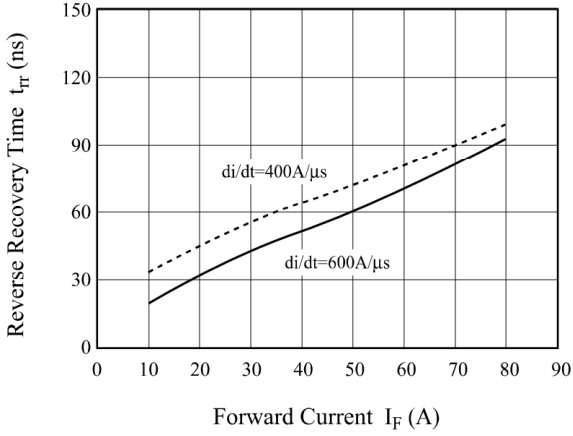


Fig 21. Switching Test Circuit

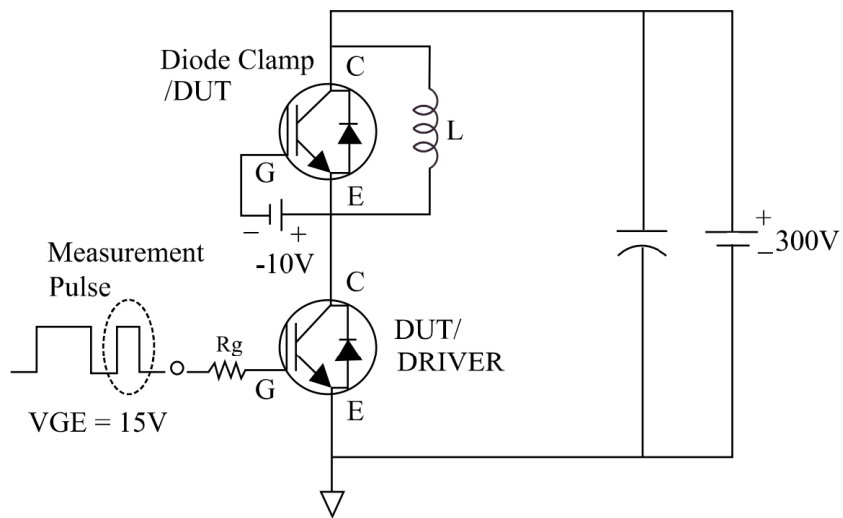


Fig 22. Definition Switching Time & Loss

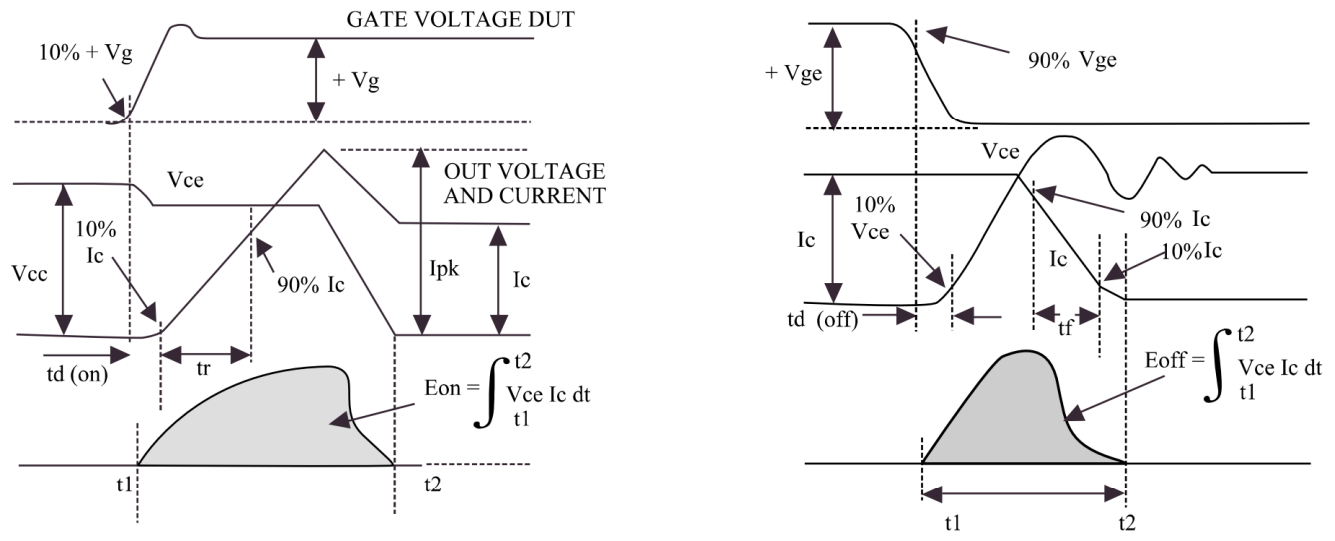
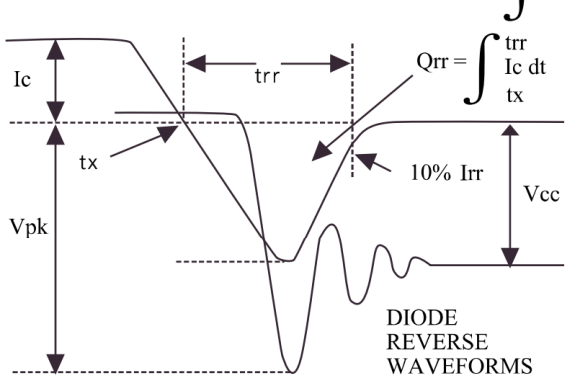
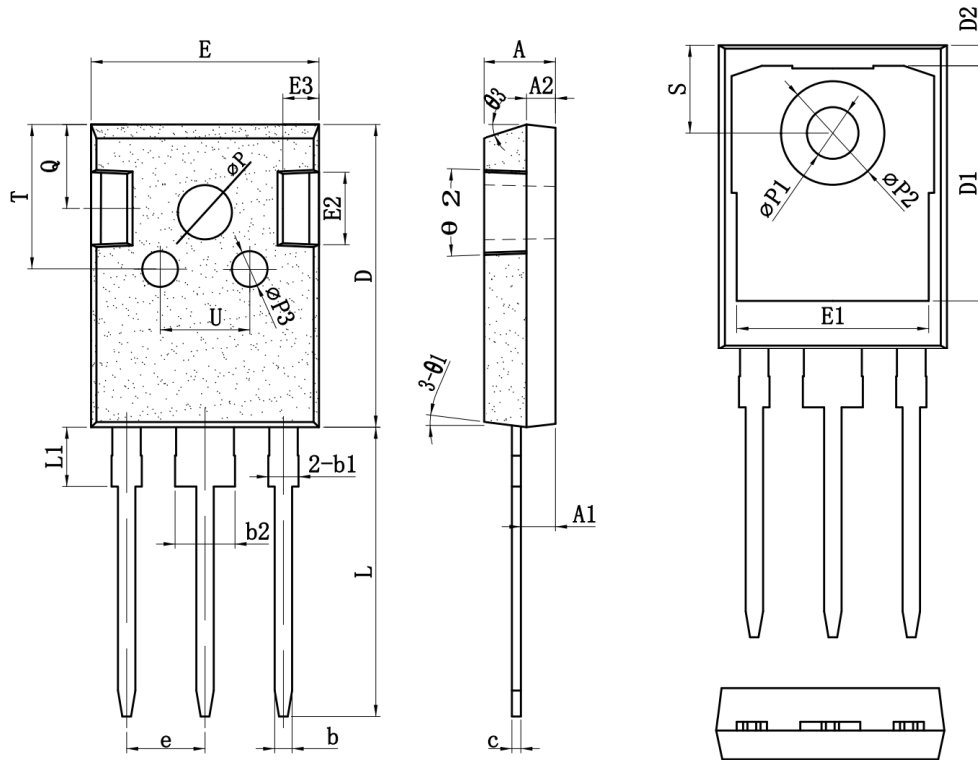


Fig 23. Definition Diode Switching Time



TO-247_3L PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	4.60	5.00	5.40	e	2.10	5.44	5.70
A1	2.10	2.41	2.70	L	19.00	19.98	21.00
A2	1.70	2.00	2.30	L1	-	-	4.50
b	1.00	1.20	1.40	ΦP	3.30	3.70	4.00
b1	1.80	2.10	2.40	ΦP1	3.25	3.55	3.85
b2	2.80	3.10	3.40	ΦP2	6.80	7.18	7.60
C	0.45	0.60	0.75	ΦP3	2.30	2.50	3.30
D	19.00	21.00	23.00	Q	5.50	5.80	6.30
D1	16.00	16.55	17.00	S	5.60	6.15	6.30
D2	0.95	1.20	1.45	T	9.50	10.00	10.50
E	15.70	15.80	16.50	U	6.00	-	8.00
E1	12.80	13.25	13.70	θ1	5°	7°	9°
E2	4.20	5.00	5.30	θ2	1°	3°	5°
E3	2.20	2.50	2.80	θ3	13°	15°	17°

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