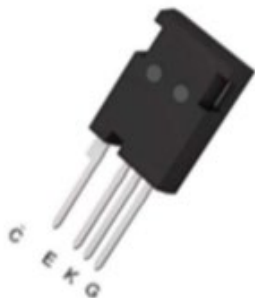
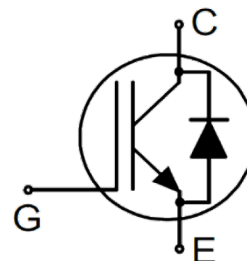


Description

TO-247PLUS-4L

Circuit Diagram
Feature

- High Input Impedance
- Low Saturation Voltage $V_{CE(SAT)}$
- Low Switching Losses
- Copacked with Fast Recovery Diode
- Low Conduction Loss for a High Efficiency
- Rugged Transient Reliability
- Low EMI

Applications

- UPS
- EV-Charger
- Solar String Inverter

Absolute maximum rating@25°C

Parameter	Symbol	Value	Units
Collector-Emitter Voltage	V_{CE}	1200	V
Gate-Emitter Voltage	V_{GE}	± 20	V
Collector Current	I_C	$T_c = 25^\circ\text{C}$	240*1
		$T_c = 100^\circ\text{C}$	140
Pulsed Collector Current	I_{CM}	560	A
Diode Current	I_F	$T_c = 25^\circ\text{C}$	240*1
		$T_c = 100^\circ\text{C}$	140
Diode Pulsed Current	I_{FM}	560	A
Power Dissipation	P_D	$T_c = 25^\circ\text{C}$	1091
		$T_c = 100^\circ\text{C}$	545
Operating Junction Temperature	T_{VJ}	-55~+175	°C
Storage Temperature	T_{STG}	-40~+150	°C

Note: 1. Limited by bondwire

Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
Collector-Emitter Breakdown Voltage	BV_{CE}	-	1200	-	-	V	
C-E Leakage Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	-	-	40	μA	
G-E Leakage Current	I_{GES}	$V_{CE}=0V$	$V_{GE}=20V$	-	-	100	nA
			$V_{GE}=-20V$	-100	-	-	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C=2.24mA, V_{CE}=V_{GE}$	-	5.17	-	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=140A, V_{GE}=15V$	$T_{Vj}=25^\circ C$	-	1.55	-	V
			$T_{Vj}=175^\circ C$	-	1.81	-	
Diode forward voltage	V_F	$I_C=140A, V_{GE}=0V$	$T_{Vj}=25^\circ C$	-	2.01	-	V
			$T_{Vj}=175^\circ C$	-	2.19	-	
Gate input resistance	R_G	$f=1MHz$	-	0.8	-	Ω	
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=100KHz$	-	16191	-	pF	
Output Capacitance	C_{oes}		-	407	-		
Reverse Transfer Capacitance	C_{res}		-	59.4	-		
Total Gate Charge	Q_g	$V_{CE}=960V, V_{GE}=0/15V, I_C=140A$	-	473	-	nC	
Gate to Emitter Charge	Q_{ge}		-	122	-		
Gate to Collector Charge	Q_{gc}		-	112	-		
Turn-on Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=140A, V_{GE}=0/15V, R_G=10\Omega, Inductive Load$	-	162	-	ns	
Rise Time	t_r		-	218	-		
Turn-off Delay Time	$t_{d(off)}$		-	348	-		
Fall Time	t_f		-	202	-		
Turn-on Energy Loss	E_{on}	$V_{CC}=600V, I_C=140A, V_{GE}=0/15V, R_G=10\Omega, Inductive Load$	-	10.8	-	mJ	
Turn-off Energy Loss	E_{off}		-	8.2	-		
Total Switching Loss	E_{st}		-	19	-		
Diode Reverse Recovery Time	T_{rr}	$V_{CC}=600V, I_C=140A, V_{GE}=0/15V, R_G=10\Omega$	-	126	-	ns	
Diode Reverse Recovery Charge	Q_{rr}		-	0.86	-	μC	
Diode Reverse Recovery Current	I_{rm}		-	13	-	A	
Diode Reverse Recovery Loss	E_{rec}		-	0.18	-	mJ	

Electrical characteristics per line @ $T_{vj} = 175^{\circ}\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Turn-on Delay Time	$t_{d(on)}$	$V_{CC}=600\text{V}, I_C=140\text{A},$ $V_{GE}=0/15\text{V}, R_G=10\Omega,$ Inductive Load	-	147	-	ns
Rise Time	t_r		-	245	-	
Turn-off Delay Time	$t_{d(off)}$		-	386	-	
Fall Time	t_f		-	259	-	
Turn-on Energy Loss	E_{on}	$V_{CC}=600\text{V}, I_C=140\text{A},$ $V_{GE}=0/15\text{V}, R_G=10\Omega,$ Inductive Load	-	10.9	-	mJ
Turn-off Energy Loss	E_{off}		-	9.2	-	
Total Switching Loss	E_{st}		-	20.1	-	
Diode Reverse Recovery Time	T_{rr}	$V_{CC}=600\text{V}, I_C=140\text{A},$ $V_{GE}=0/15\text{V}, R_G=10\Omega$	-	498	-	ns
Diode Reverse Recovery Charge	Q_{rr}		-	5.5	-	μC
Diode Reverse Recovery Current	I_{rm}		-	21	-	A
Diode Reverse Recovery Loss	E_{rec}		-	1.9	-	mJ

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, IGBT Junction to Case	$R_{th(J-C)}$	-	0.11	-	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, FRD Junction to Case	$R_{th(J-C)}$	-	0.17	-	$^{\circ}\text{C}/\text{W}$

Typical Characteristics

Fig 1. Output Characteristics (25°C)

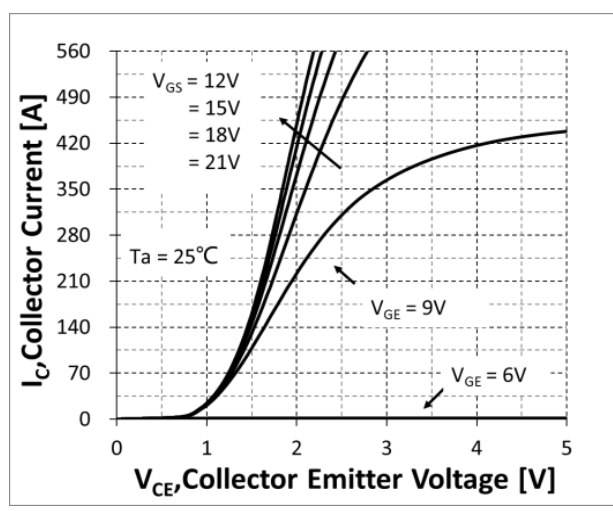


Fig 2. Output Characteristics (175°C)

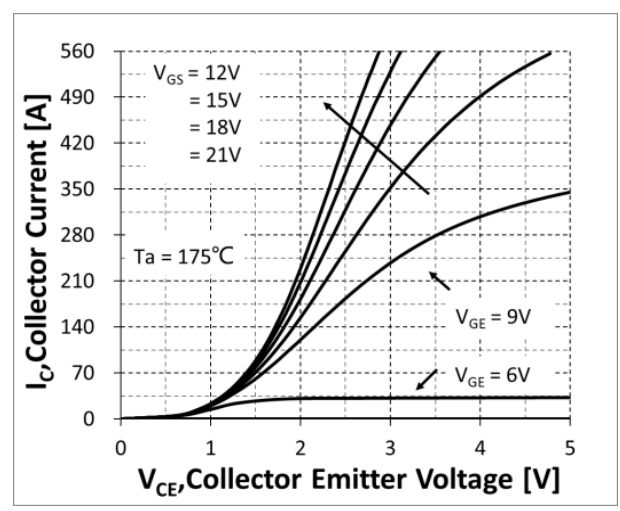


Fig 3. Forward Bias Safe Operating Area

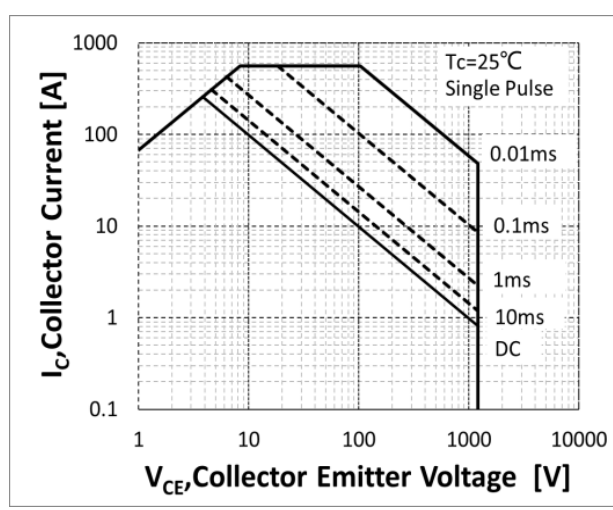


Fig 4. Transfer Characteristics

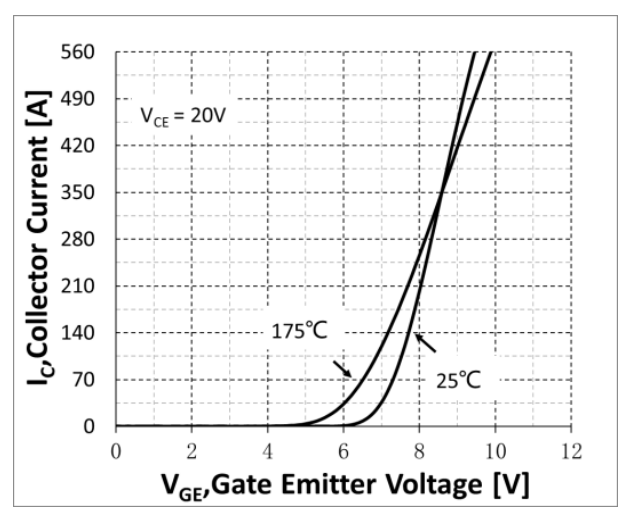


Fig 5. Gate Charge

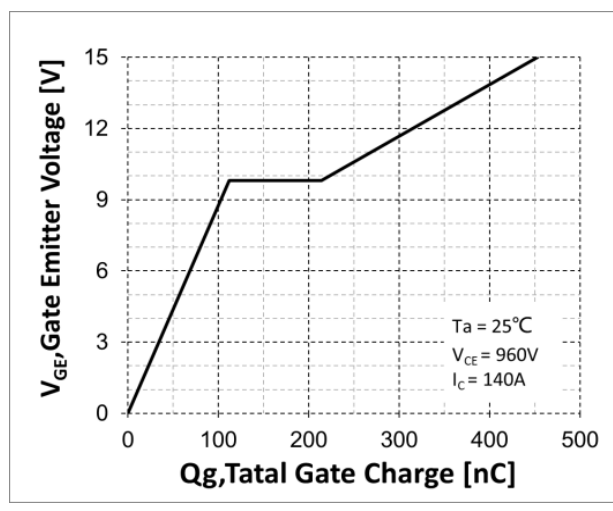
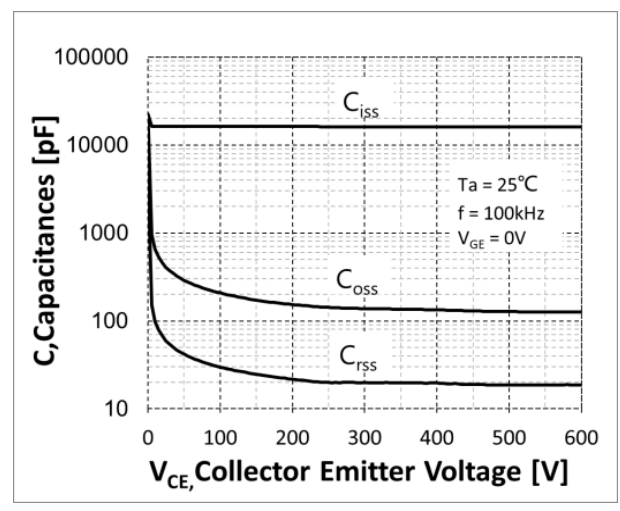


Fig 6. Typical Capacitance



Typical Characteristics

Fig 7. Switching Time vs. Gate Resistance

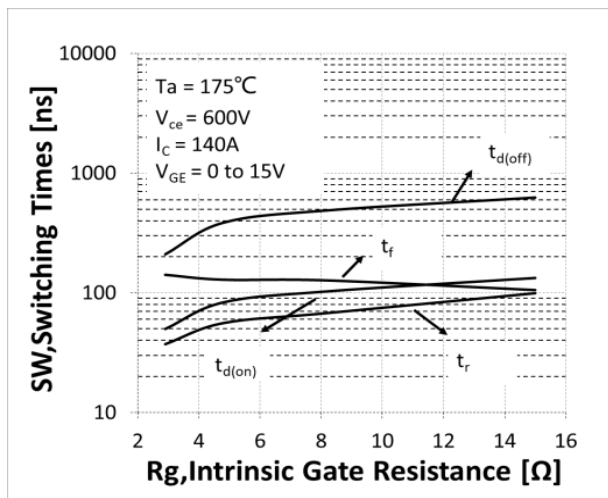


Fig 8. Switching Time vs. Collector Current

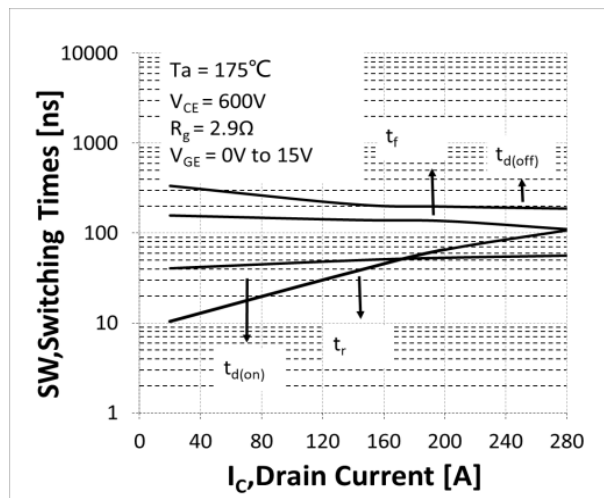


Fig 9. Switching Time vs. Junction Temperature

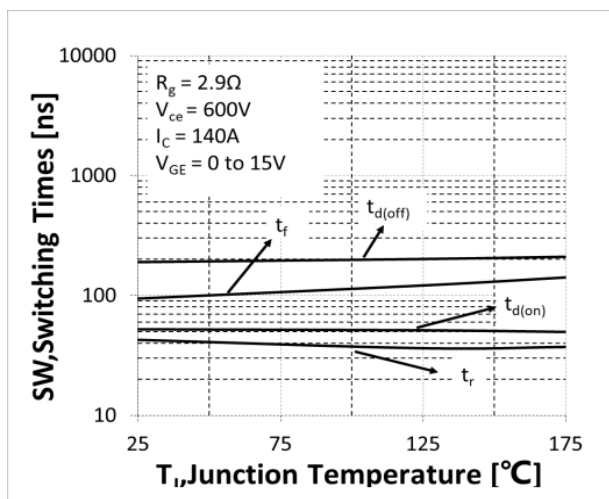


Fig 10. Switching Energy vs. Junction Temperature

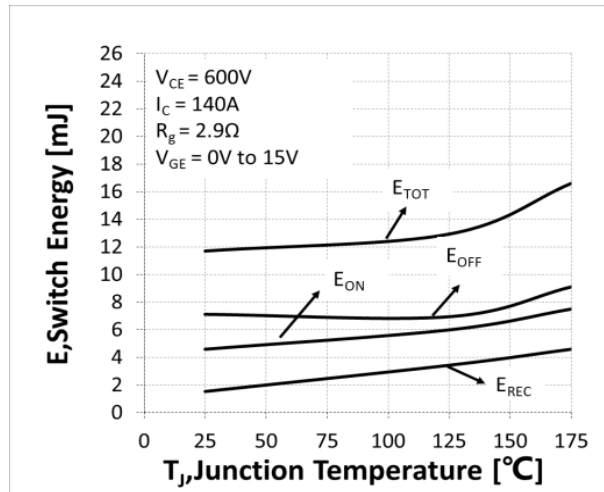


Fig 11. Switching Energy vs. Gate Resistance

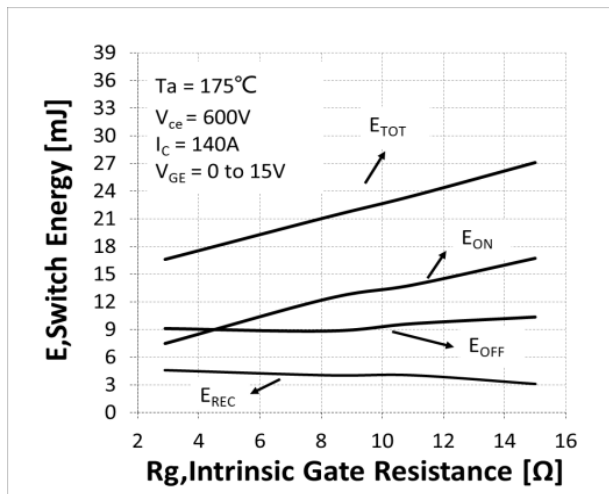
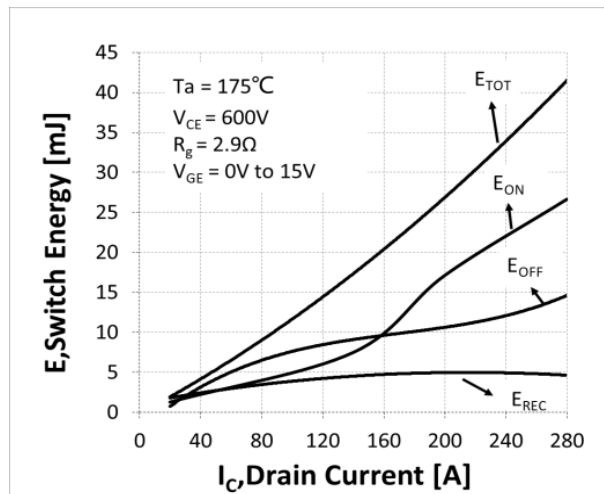


Fig 12. Switching Energy vs. Collector Current



Typical Characteristics

Fig 13. Switching Energy vs. Collector Emitter Voltage Fig 14. Saturation Voltage vs. Junction Temperature

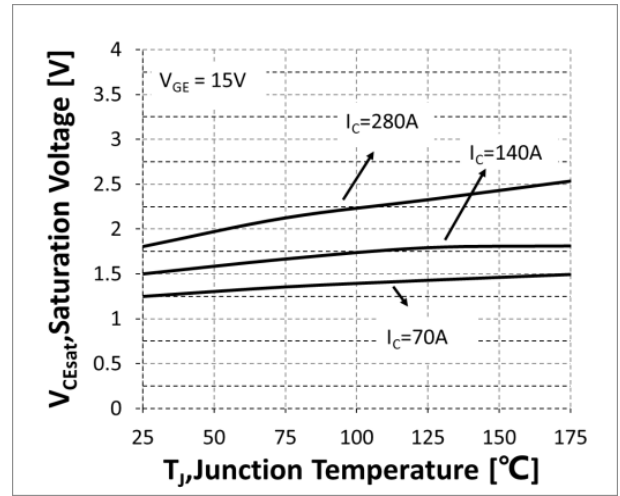
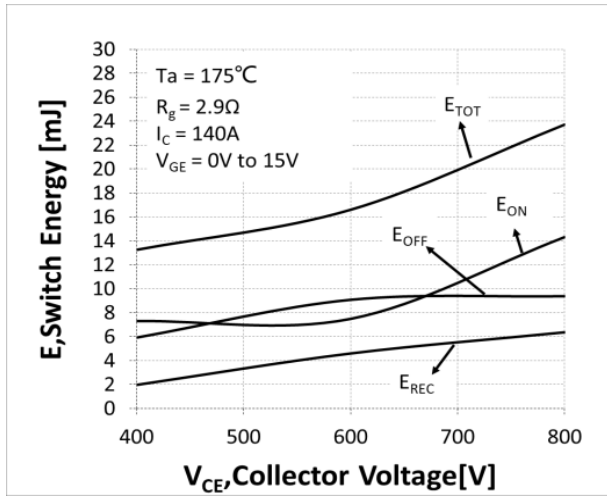


Fig 15. Gate Voltage vs. Junction Temperature

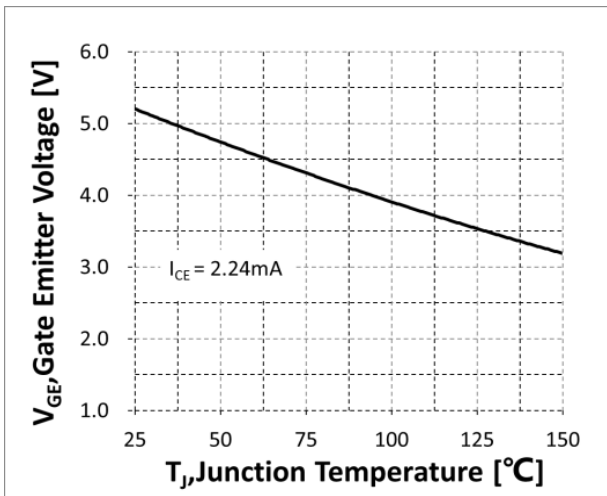


Fig 16. Diode Forward Voltage vs. Forward Current

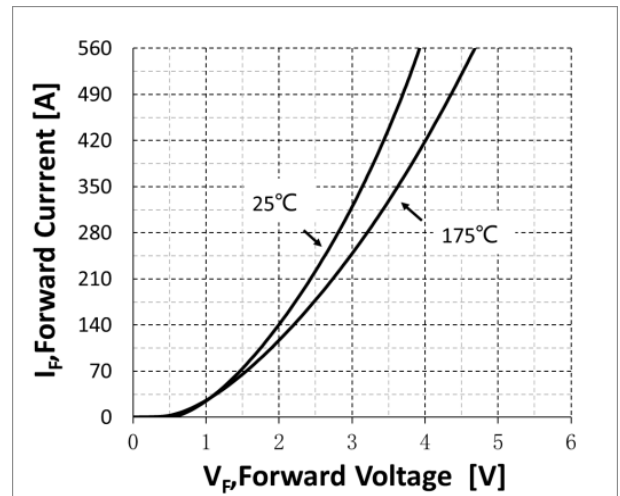


Fig 17. Transient Thermal Impedance IGBT

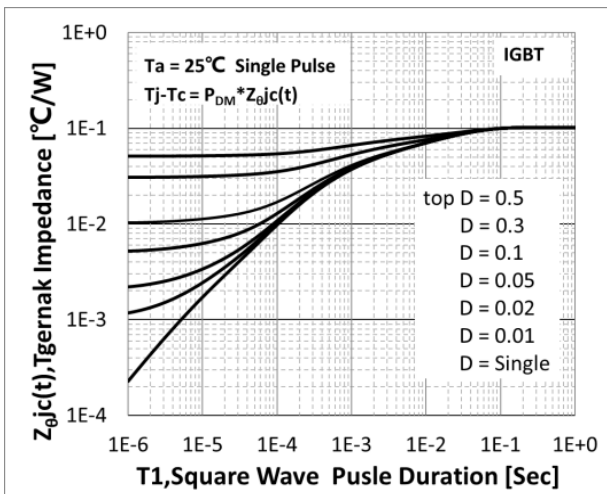
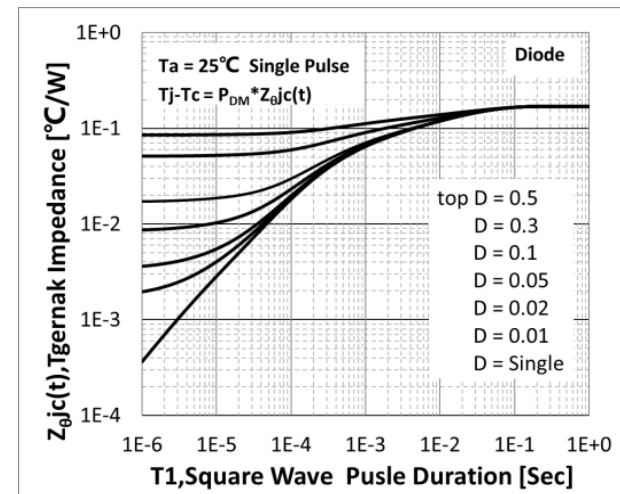
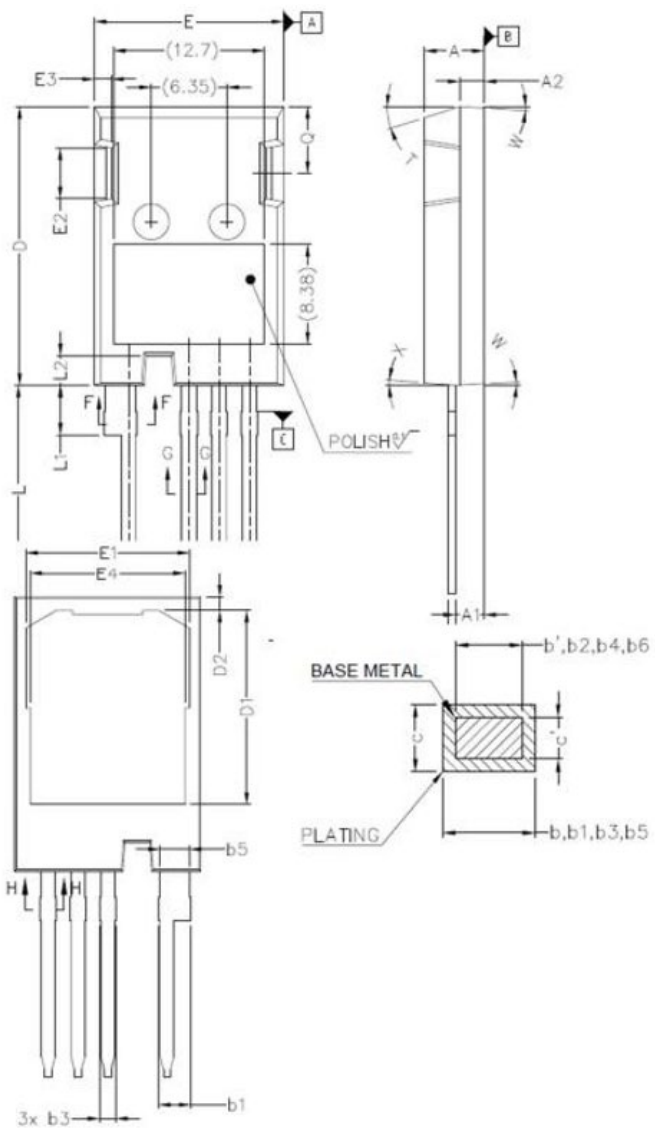



Fig 18. Transient Thermal Impedance Diode





Dim	Millimeters		Dim	Millimeters	
	Min	Max		Min	Max
A	4.83	5.21	E	15.75	16.13
A1	2.29	2.54	E1	13.1	14.15
A2	1.91	2.16	E2	3.68	5.10
b'	1.07	1.28	E3	1.00	1.90
b	1.07	1.33	E4	12.38	13.43
b1	2.39	2.94	e	2.54 BSC	
b2	2.39	2.84	e1	5.08 BSC	
b3	1.07	1.60	N	4	
b4	1.07	1.50	L	17.31	17.82
b5	2.39	2.69	L1	3.97	4.37
b6	2.39	2.64	L2	2.35	2.65
c'	0.55	0.65	Q	5.49	6.00
c	0.55	0.68	T	17.5° REF	
D	23.30	23.60	W	3.5° REF	
D1	16.25	17.65	X	4.5° REF	
D2	0.95	1.25			


IMPORTANT NOTICE

 and **Prisemi**[®] are registered trademarks of **Prisemi Electronics Co., Ltd (Prisemi)**, Prisemi reserves the right to make changes without further notice to any products herein. Prisemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Prisemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in Prisemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Prisemi does not convey any license under its patent rights nor the rights of others. The products listed in this document are designed to be used with ordinary electronic equipment or devices, Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

Website: <http://www.prisemi.com>

For additional information, please contact your local Sales Representative.

©Copyright 2009, Prisemi Electronics

 **Prisemi**[®] is a registered trademark of Prisemi Electronics.

All rights are reserved.