

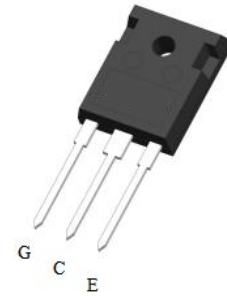
TPGW40N120LN

IGBT Discrete with Anti-Parallel Diode

Package TO-247-3

General Description

Topdiode TPGW40N120LN 40A 1200V IGBT Discrete provides ultra-low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and UPS.



Features

High Breakdown Voltage up to 1200V for Improved

Reliability

Trench Field Stop Technology

High Ruggedness, Temperature Stable

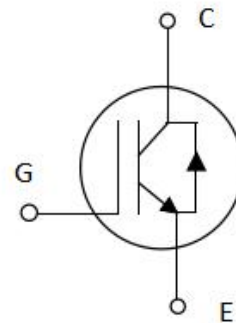
Low switching losses

Easy Parallel Switching Capability due to Positive

Temperature Coefficient in V_{CEsat}

Maximum junction temperature 175°C

Equivalent Schematic



Applications

Uninterruptible Power Supply

Inverter

Converter with High Switching Frequency

Summary

Symbol	Value
V_{CE}	1200V
I_C	40A
$V_{CE(SAT)} I_{C=40A}$	1.90V

Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Description	Value	Unit	
V_{CE}	Collector-Emitter Breakdown Voltage	1200	V	
I_C	DC Collector Current, Limited by T_{jmax}	$T_C=25^\circ\text{C}$	80	A
		$T_C=100^\circ\text{C}$	40	A
I_F	Diode Forward Current, Limited by T_{jmax}	$T_C=25^\circ\text{C}$	80	A
		$T_C=100^\circ\text{C}$	40	A
V_{GE}	Continuous Gate-Emitter voltage	± 20	V	
V_{GE}	Transient Gate-Emitter voltage($t_p \leq 10\mu\text{s}, D < 0.010$)	± 30	V	
I_{CRM}	Repetitive peak collector current, $t_p = 1\text{ms}$	80	A	
I_{CM}	Pulse Collector Current, $V_{GE} = 15\text{V}$, t_p Limited by T_{jmax}	160	A	
P_{tot}	Power Dissipation, $T_j=25^\circ\text{C}$	500	W	
T_j	Operating Junction Temperature	-40 to +175	$^\circ\text{C}$	
T_S	Storage Temperature	-55 to +150	$^\circ\text{C}$	
-	Soldering Temperature, Wave Soldering 1.6mm (0.063in.) from Case for 10s	260	$^\circ\text{C}$	

Thermal Characteristics

Symbol	Description	Max	Unit
R_{thJC}	IGBT Thermal Resistance, Junction - Case	0.3	K/W
R_{thJC}	Diode Thermal Resistance, Junction - Case	0.65	K/W
R_{thJA}	Thermal Resistance, Junction - Ambient	40	K/W

Electrical Characteristics (T_j= 25°C unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
Static						
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V , I _C =250uA	1200			V
		V _{GE} =0V , I _C =0.75mA	1200			V
V _{GE(th)}	Gate Threshold Voltage	V _{GE} =V _{CE} , I _C =1.5mA	4.5	5.0	5.5	V
V _(sat)	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =40A	T _j =25°C	1.90		V
			T _j =125°C	2.25		
			T _j =150°C	2.35		
I _{CES}	Zero Gate Voltage Collector Current	V _{CE} = 1200V, V _{GE} = 0V	T _j =25°C		200	μA
			T _j =150°C		4000	
I _{GES}	Gate-Emitter Leakage Current	V _{CE} = 0V, V _{GE} = ±20V			100	nA
Dynamic						
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} = 0V, f=1MHz		2128		pF
C _{res}	Reverse Transfer Capacitance			82		
Q _G	Gate Charge	V _{CC} = 960V, I _C = 40A, V _{GE} = 15V		213		nC

Switching Characteristic, Inductive Load

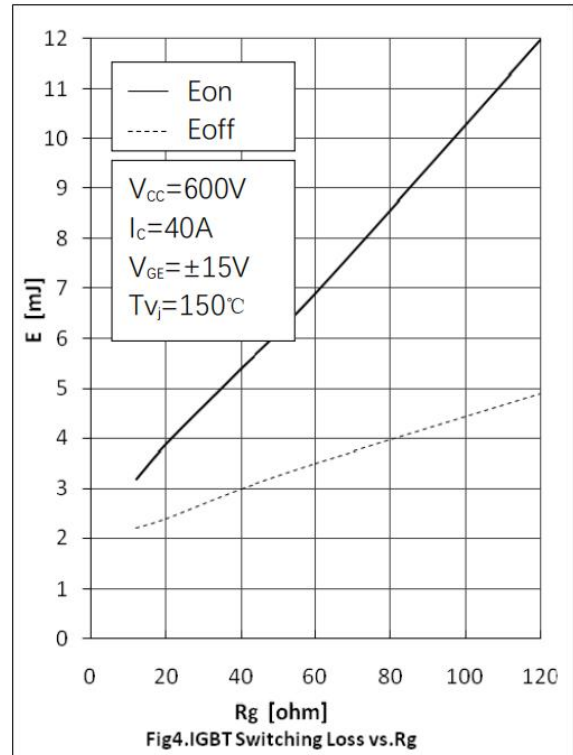
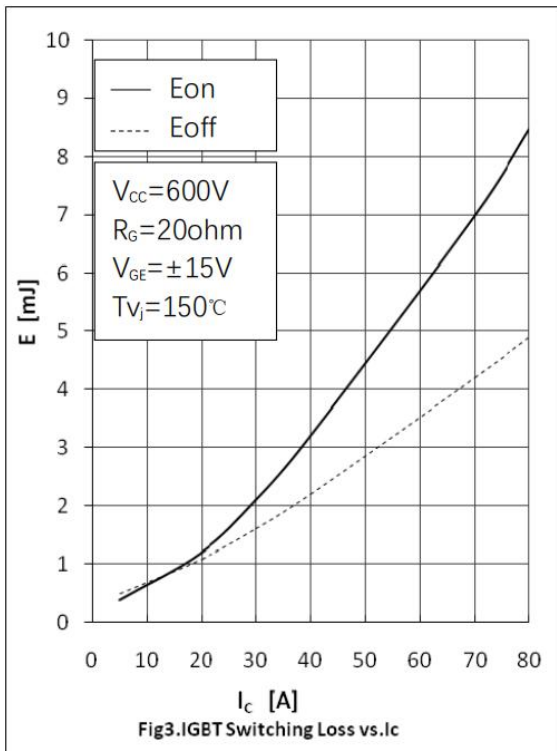
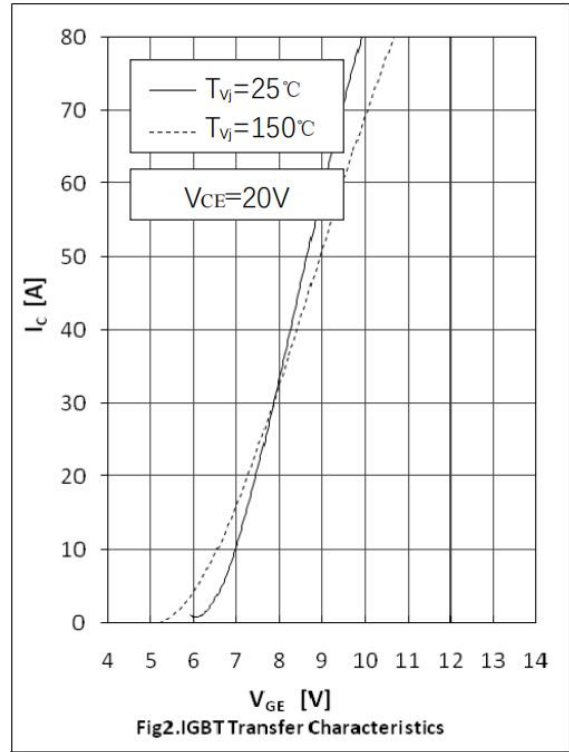
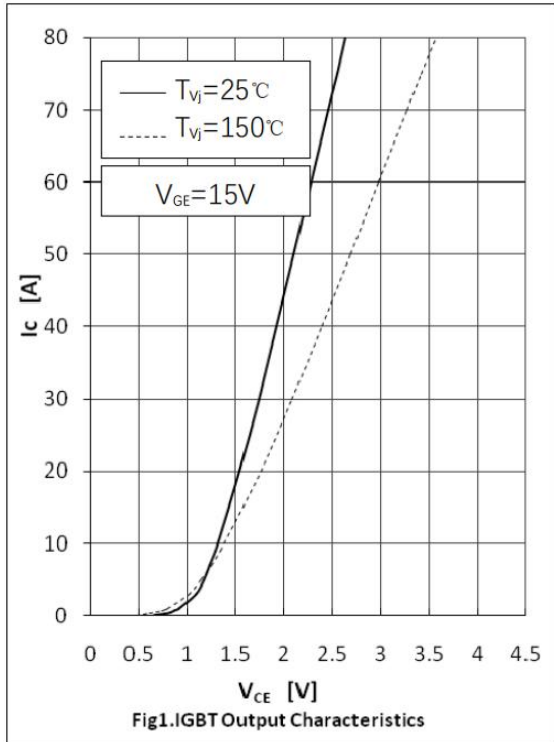
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
Dynamic T_j=25°C						
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =40.0A, V _{GE} =-15.0/15.0V, R _g =12Ω		10		ns
t _r	Rise Time			23		ns
t _{d(off)}	Turn-off Delay Time			162		ns
t _f	Fall Time			138		ns
E _{on}	Turn-on Energy			2.18		mJ
E _{off}	Turn-off Energy			1.52		mJ
Dynamic T_j=125°C						
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =40.0A, V _{GE} =-15.0/15.0V, R _g =12Ω		12		ns
t _r	Rise Time			31		ns

$t_{d(off)}$	Turn-off Delay Time			178		ns
t_f	Fall Time			182		ns
E_{on}	Turn-on Energy			2.96		mJ
E_{off}	Turn-off Energy			2.01		mJ
Dynamic $T_j=150^\circ\text{C}$						
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C=40.0\text{A},$ $V_{GE}=-15.0/15.0\text{V},$ $R_g=12\Omega$		13		ns
t_r	Rise Time			35		ns
$t_{d(off)}$	Turn-off Delay Time			192		ns
t_f	Fall Time			201		ns
E_{on}	Turn-on Energy			3.24		mJ
E_{off}	Turn-off Energy			2.18		mJ

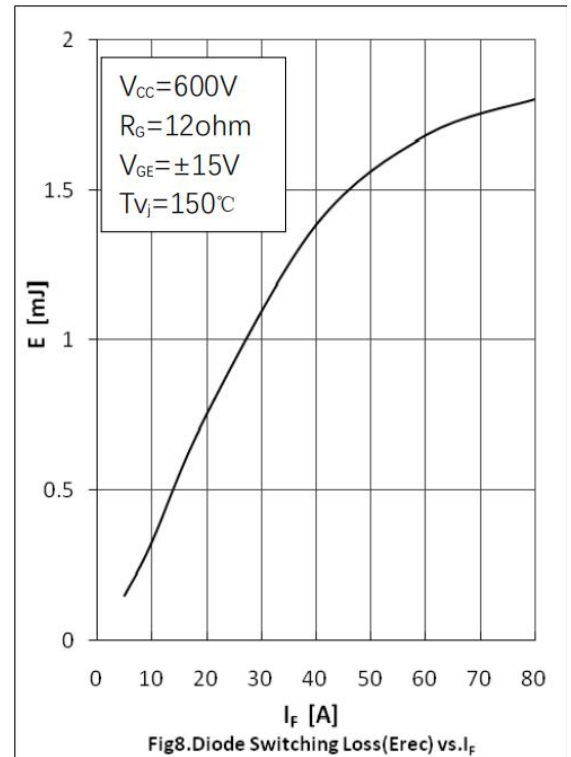
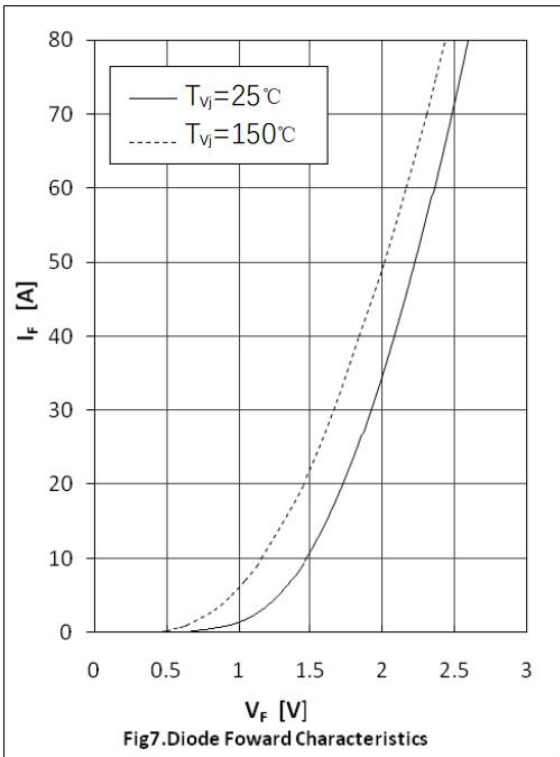
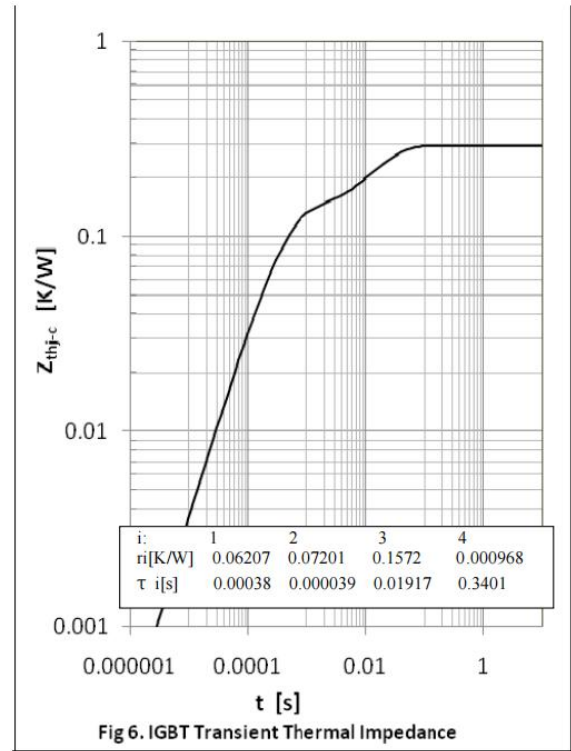
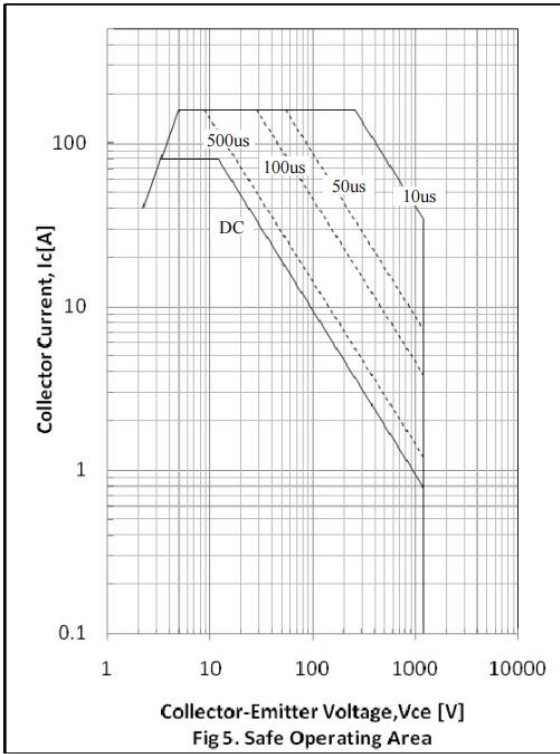
Electrical Characteristics of the DIODE ($T_j = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
V_{FM}	Diode Forward Voltage	$I_F = 40\text{A}, T_j=25^\circ\text{C}$		2.00		V
		$I_F = 40\text{A}, T_j=125^\circ\text{C}$		1.90		
		$I_F = 40\text{A}, T_j=150^\circ\text{C}$		1.85		
T_{rr}	Reverse Recovery Time	$I_F= 40\text{A},$ $V_R = 600\text{V},$ $di/dt= -520\text{A}/\mu\text{s},$ $T_j=25^\circ\text{C}$		235		ns
I_{rr}	Reverse Recovery Current			14		A
Q_{rr}	Reverse Recovery Charge			1.50		μC
E_{rec}	Reverse Recovery Energy			0.48		mJ
T_{rr}	Reverse Recovery Time	$I_F= 40\text{A},$ $V_R = 600\text{V},$ $di/dt= -520\text{A}/\mu\text{s},$ $T_j=125^\circ\text{C}$		386		ns
I_{rr}	Reverse Recovery Current			16		A
Q_{rr}	Reverse Recovery Charge			4.20		μC
E_{rec}	Reverse Recovery Energy			1.10		mJ
T_{rr}	Reverse Recovery Time	$I_F= 40\text{A},$ $V_R = 600\text{V},$ $di/dt= -520\text{A}/\mu\text{s},$ $T_j=150^\circ\text{C}$		422		ns
I_{rr}	Reverse Recovery Current			18		A
Q_{rr}	Reverse Recovery Charge			4.80		μC
E_{rec}	Reverse Recovery Energy			1.38		mJ

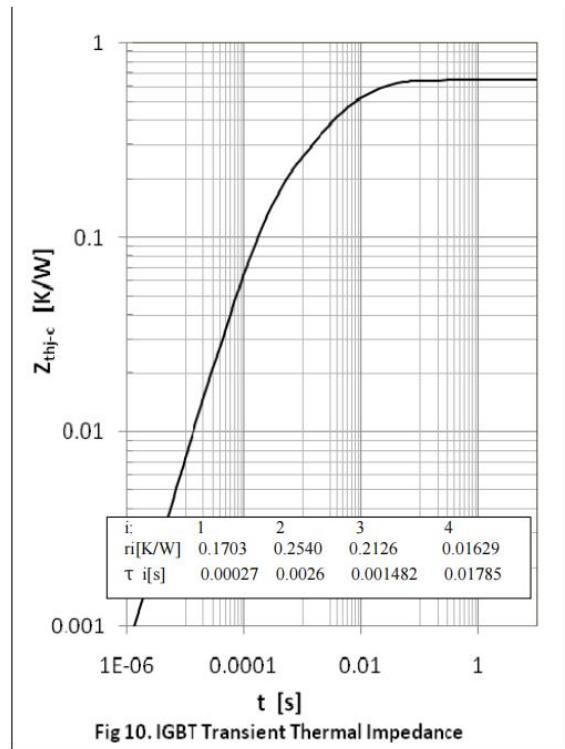
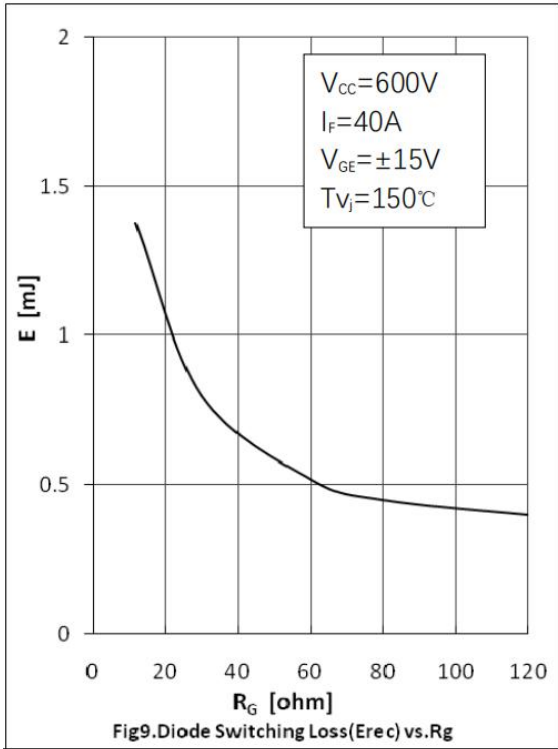
Typical Performance



Typical Performance

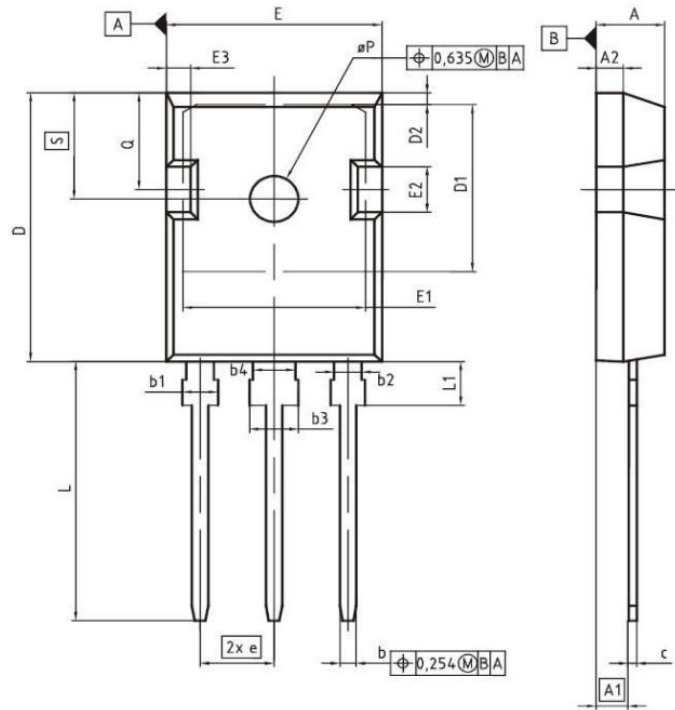


Typical Performance



Package Dimensions

TO-247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	5.44(BSC)		0.214(BSC)	
N	3		3	
L	19.80	20.32	0.780	0.800
L1	4.10	4.47	0.161	0.176
ΦP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248

UNIT:mm