



600V N-Channel Super-Junction MOSFET

Features

- Much lower $R_{on} \cdot A$ performance for On-state efficiency
- Super_Junction technology
- Better efficiency due to very low FOM
- Ultra-fast body diode
- Fast switching

Applications

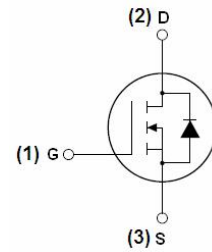
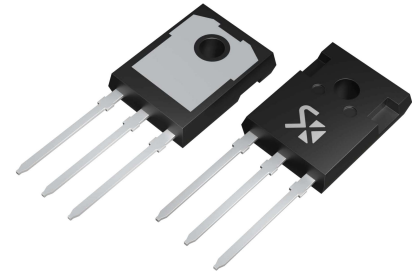
- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Charger
- Power Supply

100% UIS TESTED!

100% ΔV_{ds} TESTED!

Product Summary

VDS	600	V
RDS(on), Typ. @VGS=10V	22	mΩ
ID	91	A



TO-247-3

Absolute Maximum Ratings

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

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	91*	A
	- Continuous ($T_C = 100^\circ\text{C}$)	57*	A
I_{DM}	Drain Current - Pulsed (Note 1)	364	A
V_{GSS}	Gate-Source Voltage	± 30	V
EAS	Single Pulsed Avalanche Energy (Note 2)	702	mJ
I_{AR}	Avalanche Current (Note 1)	10.5	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	5.68	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	20	V/ns
	MOSFET dv/dt	100	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	568	W
	- Derate above 25°C	4.55	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	260	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.22	$^\circ\text{C/W}$
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	-	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^\circ\text{C/W}$



Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μ A	600	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 600 V, V _{GS} = 0 V	--	--	1	μ A
		V _{DS} = 520V, T _C = 125°C	--	--	10	μ A
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V	--	--	-100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μ A	3.0	3.8	5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 30A	--	22	28	m Ω

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 100 V, V _{GS} = 0 V, f = 1.0 MHz	--	8950	-	pF
C _{oss}	Output Capacitance		--	175	-	pF
C _{rss}	Reverse Transfer Capacitance		--	8.1	-	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DS} = 400 V, I _D = 37.5A, R _G = 2.7 Ω , V _{GS} = 10 V (Note 4, 5)	--	26.7	--	ns
t _r	Turn-On Rise Time		--	11	--	ns
t _{d(off)}	Turn-Off Delay Time		--	138	--	ns
t _f	Turn-Off Fall Time		--	9.3	--	ns
Q _g	Total Gate Charge	V _{DS} = 400 V, I _D = 30 A, V _{GS} = 10 V (Note 4, 5)	--	186	--	nC
Q _{gs}	Gate-Source Charge		--	48	--	nC
Q _{gd}	Gate-Drain Charge		--	66	--	nC
R _G	Gate Resistance	f = 1MHz		3.6		Ω

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	91	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	364	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S =20A	--	0.6	1.2	V
t _{rr}	Reverse Recovery Time	V _{DD} = 400 V, I _S = 30A, dI _F / dt = 100 A/us (Note 4)	--	177	--	ns
Q _{rr}	Reverse Recovery Charge		--	1.72	--	uC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS} = 10.5A, R_G = 25 Ω , Starting T_J = 25°C
3. I_{SD} $\leq$ 30A, di/dt $\leq$ 100A/us, V_{DD} $\leq$ 400, Starting T_J = 25°C
4. Pulse Test : Pulse width $\leq$ 300us, Duty cycle $\leq$ 2%
5. Essentially independent of operating temperature

Typical Performance Characteristics

Fig 1. Output Characteristics (Tj=25°C)

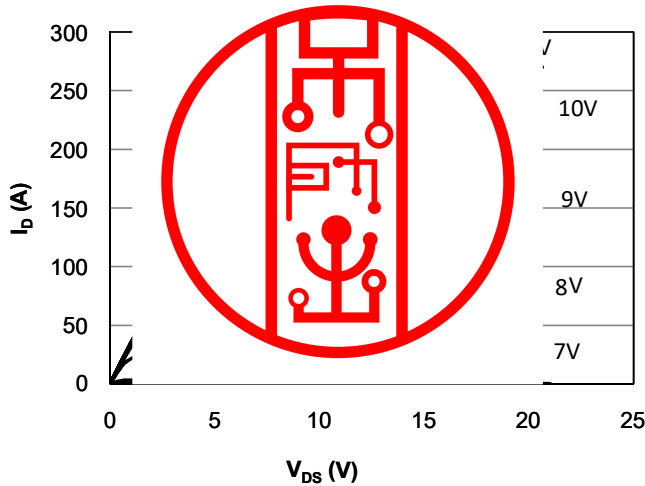


Fig 2. Output Characteristics (Tj=150°C)

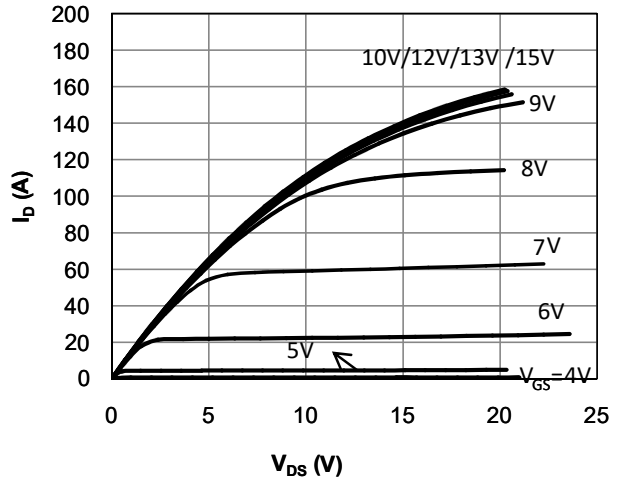


Fig 3: Transfer Characteristics

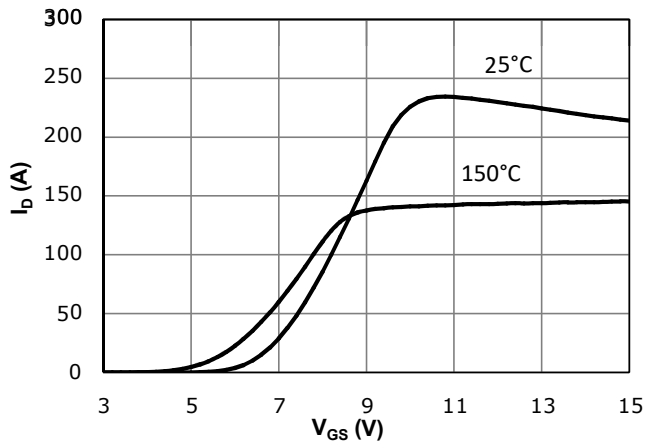


Fig 4: V_{TH} Vs T_j Temperature Characteristics

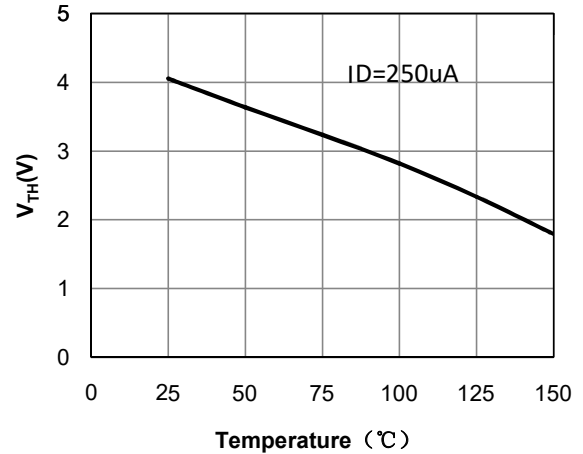


Fig 5: $R_{DS(on)}$ Vs I_{DS} Characteristics (Tj=25°C)

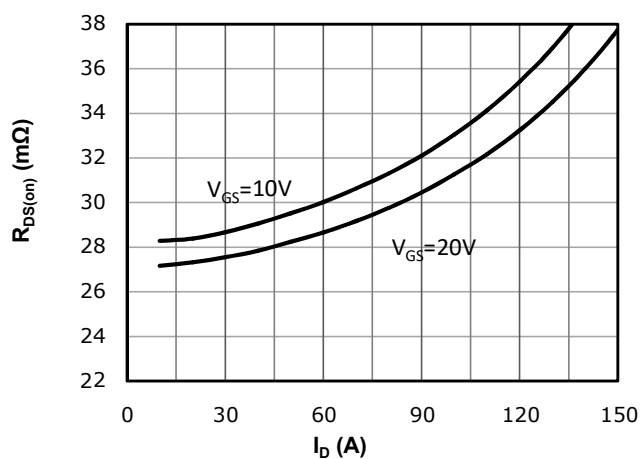
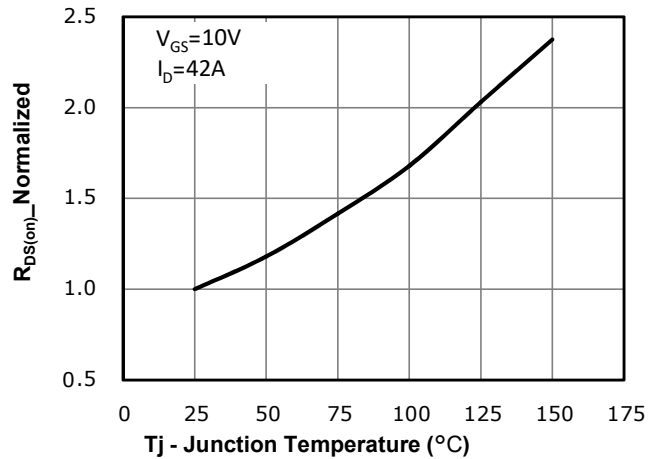


Fig 6: $R_{DS(on)}$ vs. Temperature



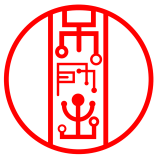


Fig 7: BVDSS vs. Temperature

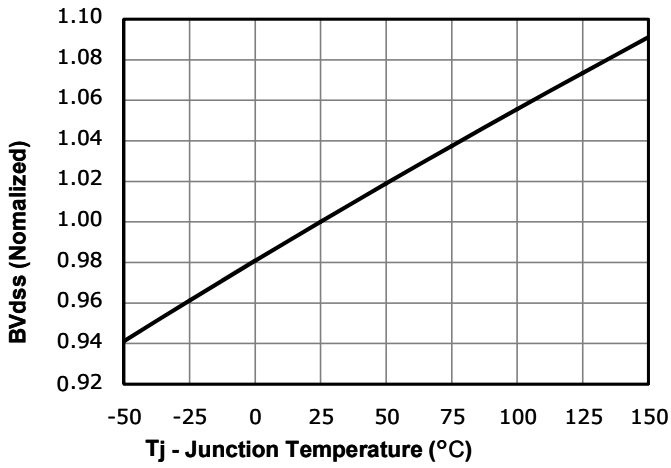


Fig 8: Rds(on) vs Gate Voltage

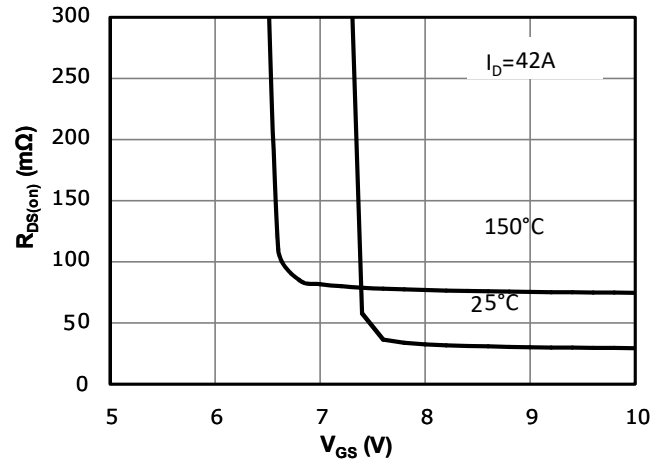


Fig 9: Body-diode Forward Characteristics

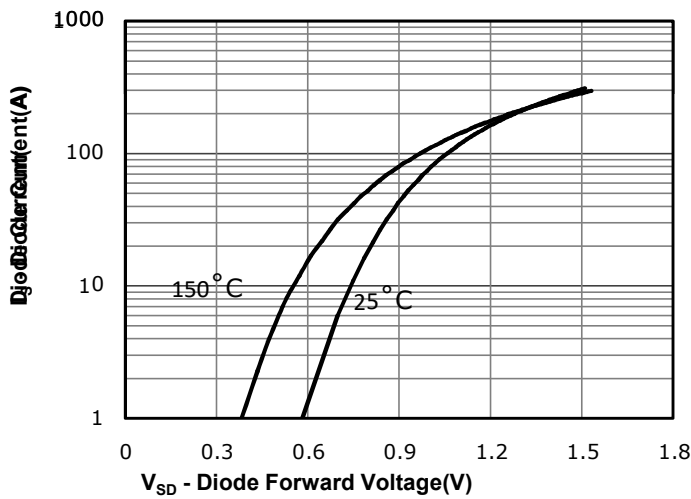


Fig 10: Gate Charge Characteristics

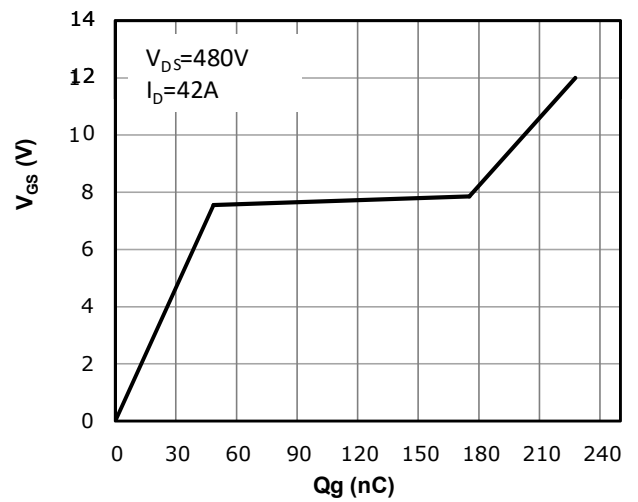


Fig 11: Capacitance Characteristics

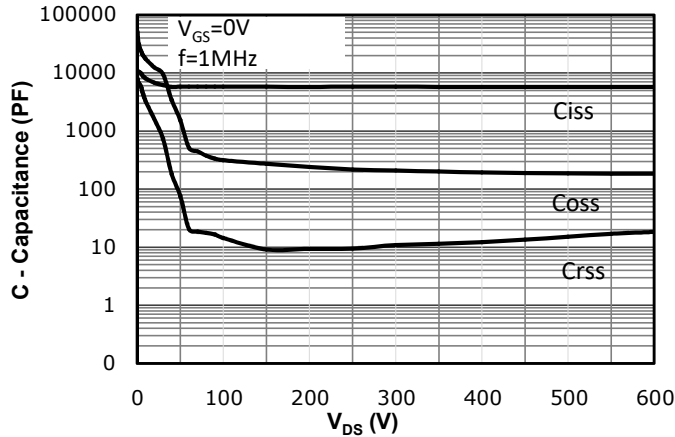
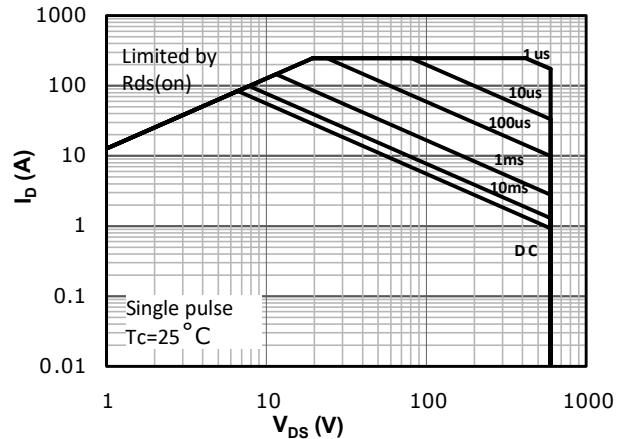


Fig 12: Safe Operating Area



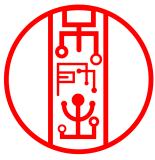
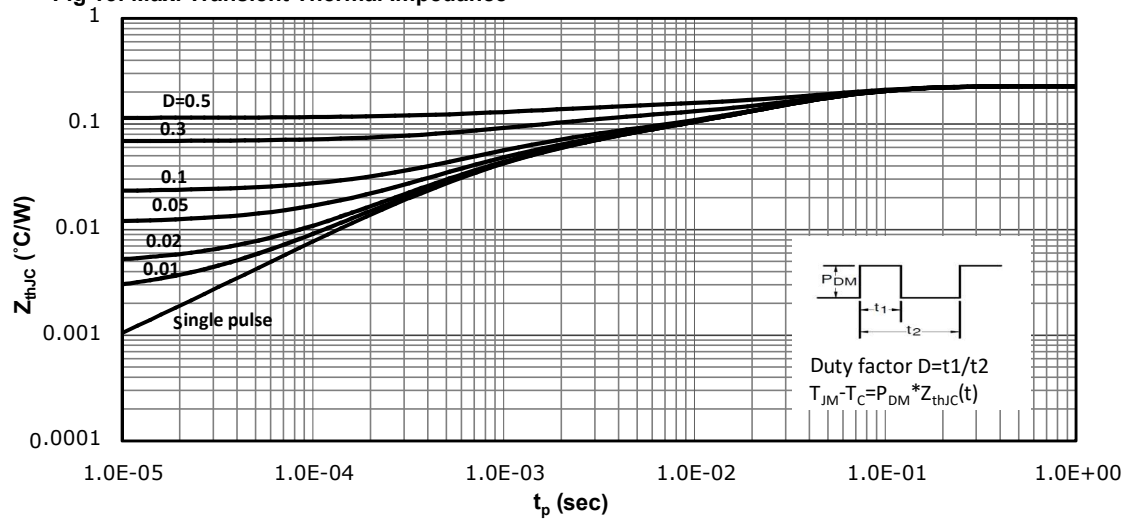
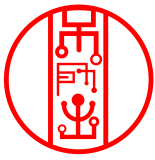
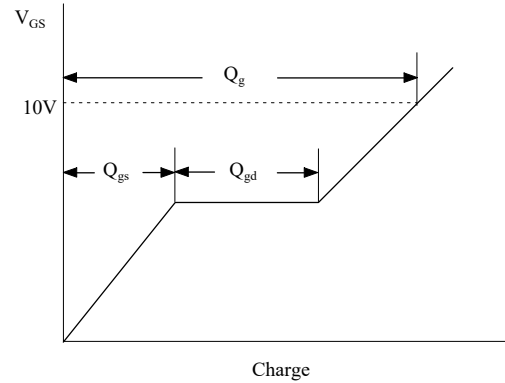
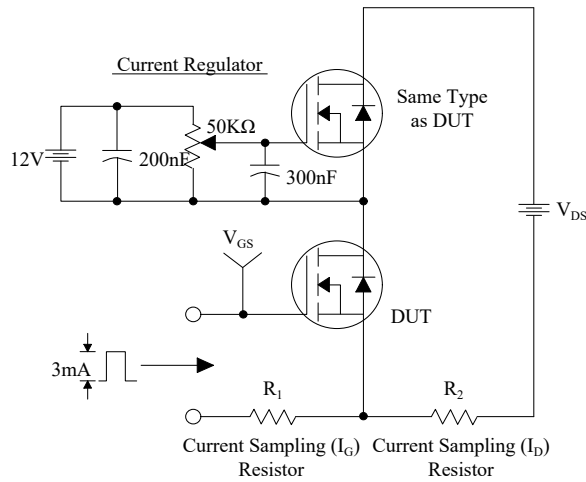


Fig 13: Max. Transient Thermal Impedance

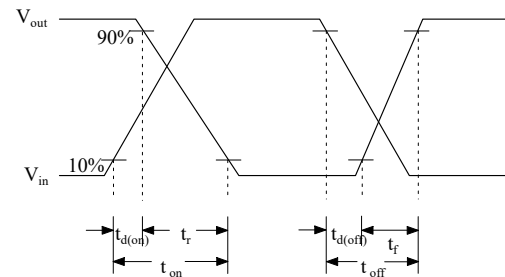
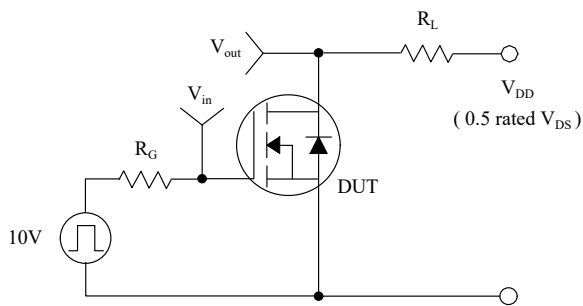




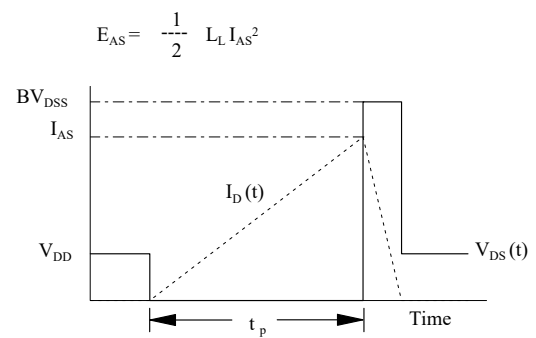
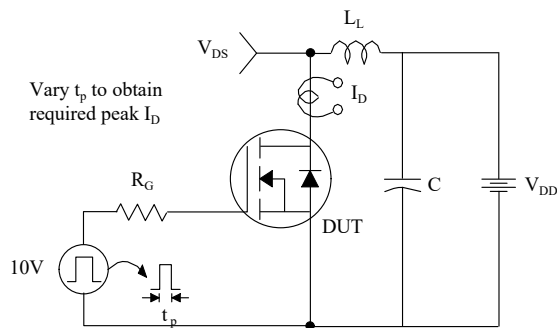
Gate Charge Test Circuit & Waveform

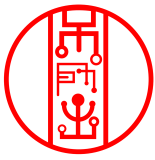


Resistive Switching Test Circuit & Waveforms

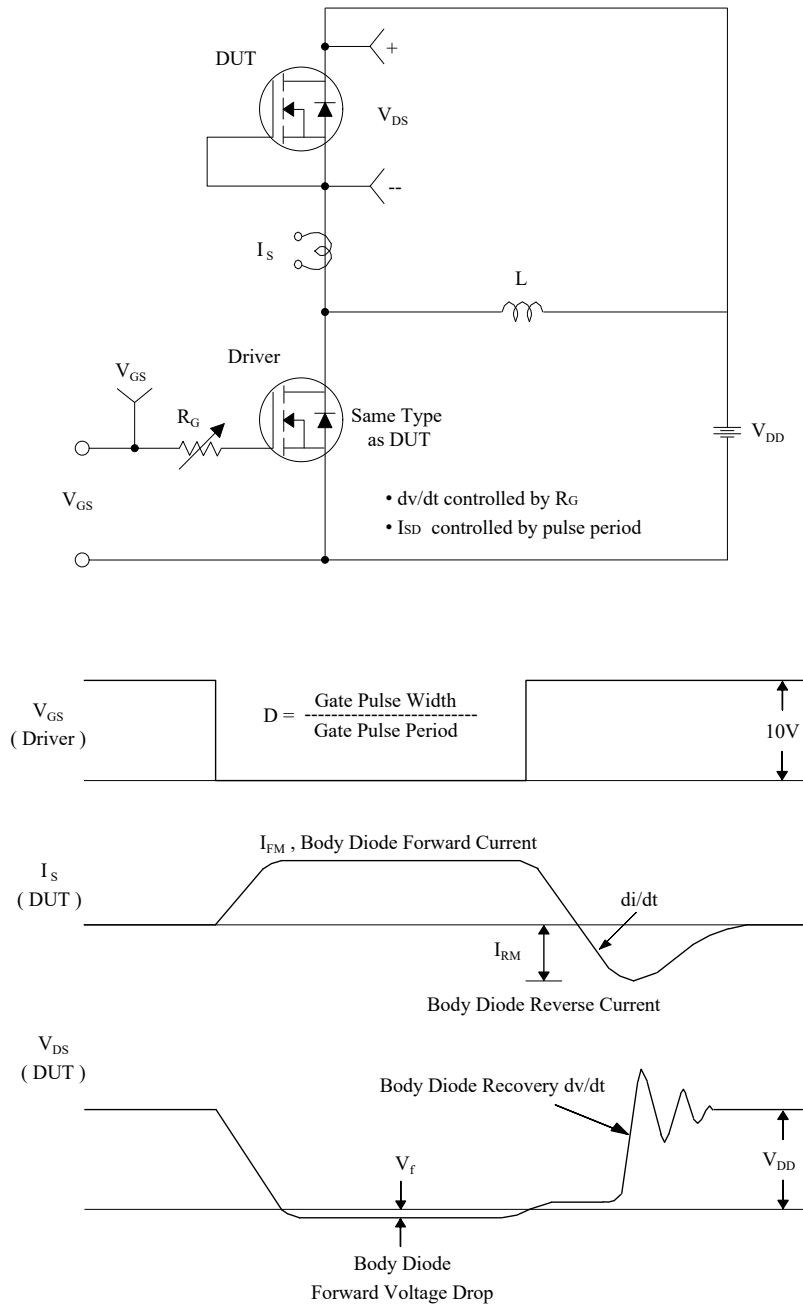


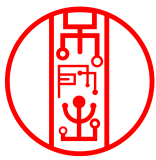
Unclamped Inductive Switching Test Circuit & Waveforms



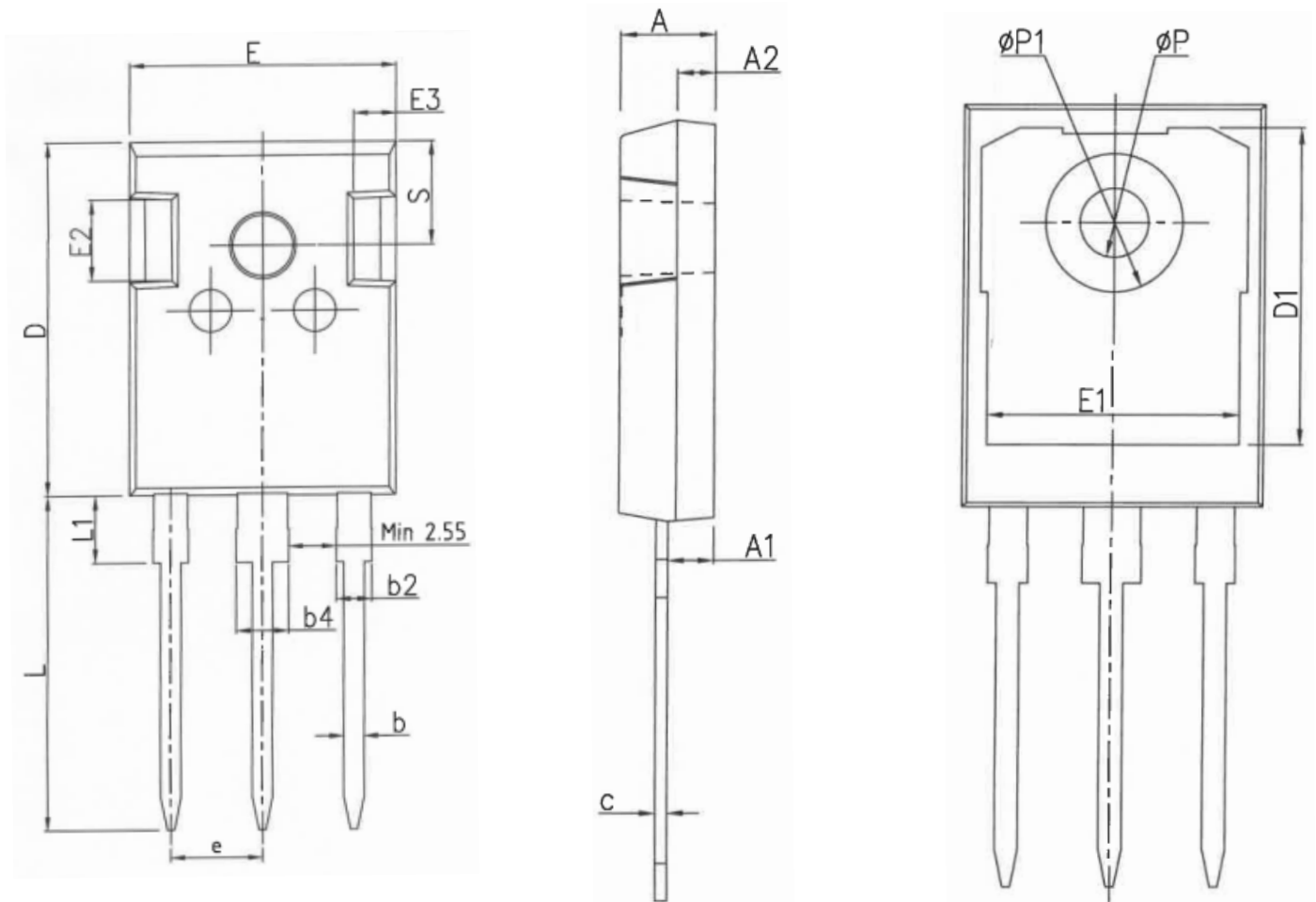


Peak Diode Recovery dv/dt Test Circuit & Waveforms





TO-247-3 PACKAGE INFORMATION



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		