

Features

- Low drain-source on-resistance: $R_{DS(ON)}=0.03\Omega(\text{typ})$
- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Extremely low switching loss
- 100% avalanche tested
- RoHS compliant

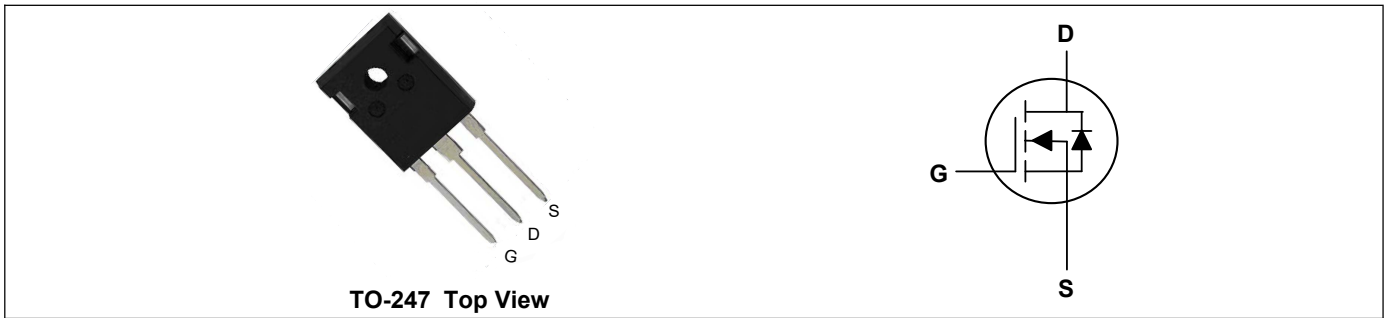
Key Performance Parameters



Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(ON),max}$	38	mΩ
I_D	80	A
$Q_{g,typ}$	192	nC
I_{DM}	320	A

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ¹	$I_D @ T_C=25^\circ\text{C}$	80	A
Continuous Drain Current ¹	$I_D @ T_C=100^\circ\text{C}$	40	A
Pulsed Drain Current ²	I_{DM}	320	A
Single Pulse Avalanche Energy ⁴	E_{AS}	81	mJ
Total Power Dissipation	P_D	680	W
Storage Temperature Range	T_{STG}	-55 to 175	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	33	$^\circ\text{C/W}$
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.19	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=40A$	---	30	38	m Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	3.2	---	4.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	10	μA
		$V_{DS}=650V, V_{GS}=0V, T_J=150^{\circ}\text{C}$	---	---	100	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	---	---	Ω
Total Gate Charge	Q_g	$V_{DS}=520V, V_{GS}=10V, I_D=40A$	---	192	---	nC
Gate-Source Charge	Q_{gs}		---	56	---	
Gate-Drain Charge	Q_{gd}		---	75	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DS}=325V, R_G=25\Omega, I_D=40A, V_{GS}=10V$	---	198	---	ns
Rise Time	T_r		---	97	---	
Turn-Off Delay Time	$T_{d(off)}$		---	473	---	
Fall Time	T_f		---	110	---	
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V, f=1\text{MHz}$	---	9350	---	pF
Output Capacitance	C_{oss}		---	375	---	
Reverse Transfer Capacitance	C_{rss}		---	10	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	I_S	$T_C=25^{\circ}\text{C}$	---	---	80	A
Pulsed Source Current	I_{SM}		---	---	320	A
Diode Forward Voltage	V_{SD}	$V_G=0V, I_S=40A, T_J=25^{\circ}\text{C}$	---	---	1.2	V

Note:

- Limited by $T_{J,max}$. Maximum Duty Cycle $D = 0.50$
- Pulse width t_p limited by $T_{J,max}$
- Identical low side and high side switch with identical R_G
- $V_{DD}=50V, R_G=25\Omega, I_{AS}=12A, L=60\text{mH}$

Typical Characteristics

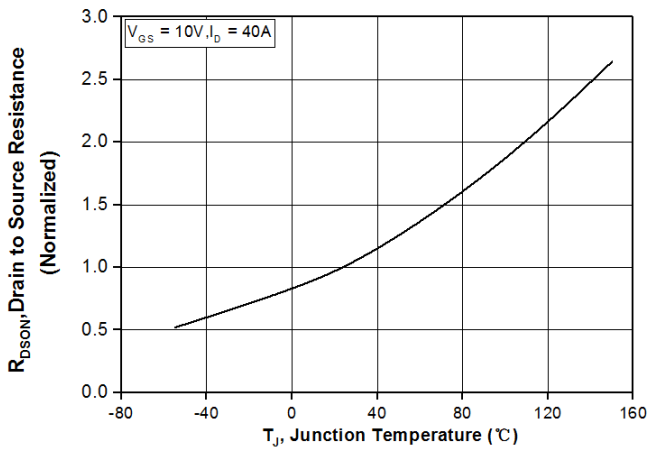


Fig 1. $R_{DS(ON)}$ vs junction temperature

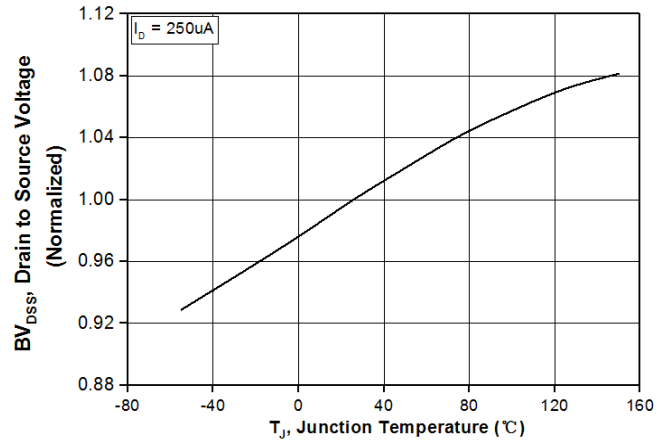


Fig 2. BV_{DSS} vs junction temperature

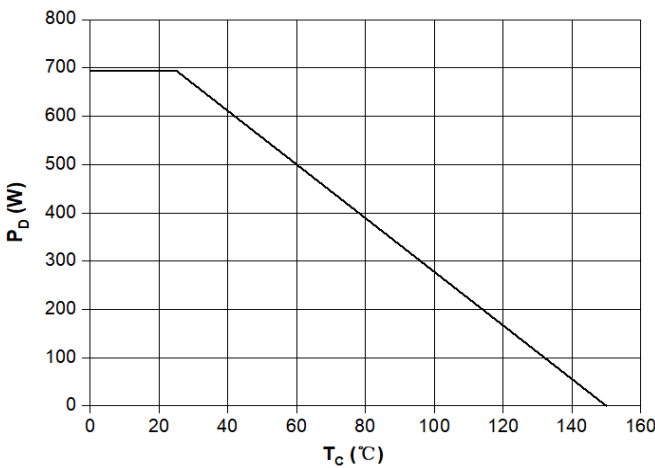


Fig 3 . Power dissipation

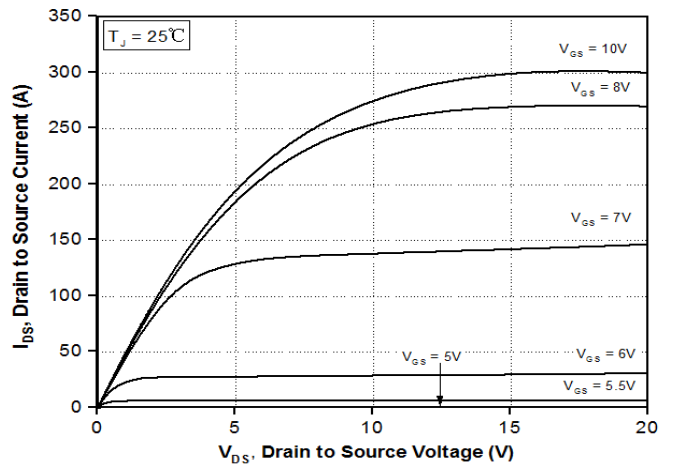


Fig 4. Output characteristics $T_J=25^\circ\text{C}$

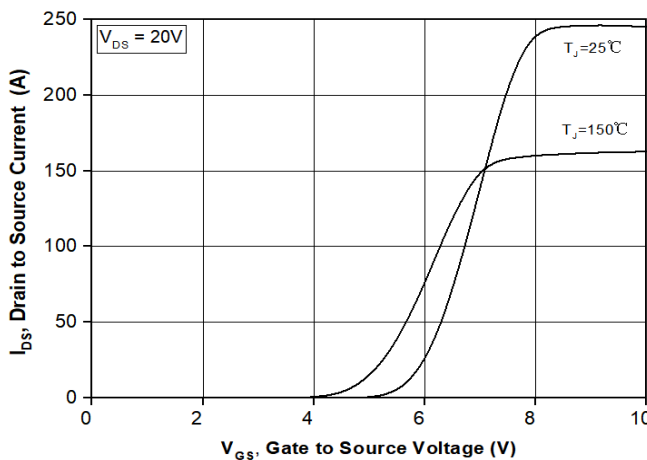


Fig 5 . Transfer characteristics

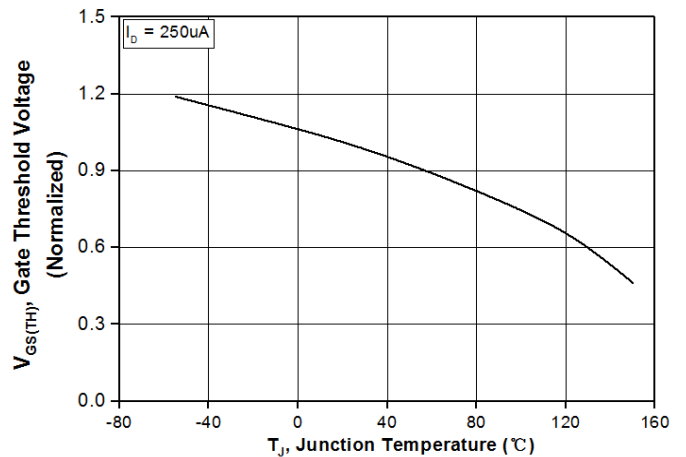


Fig 6 . $V_{GS(TH)}$ vs junction temperature

650V Super Junction Power MOSFET

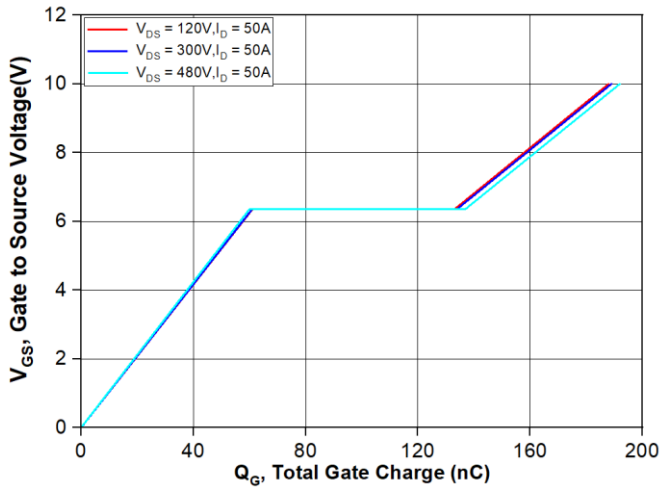


Fig 7. Gate charge characteristics

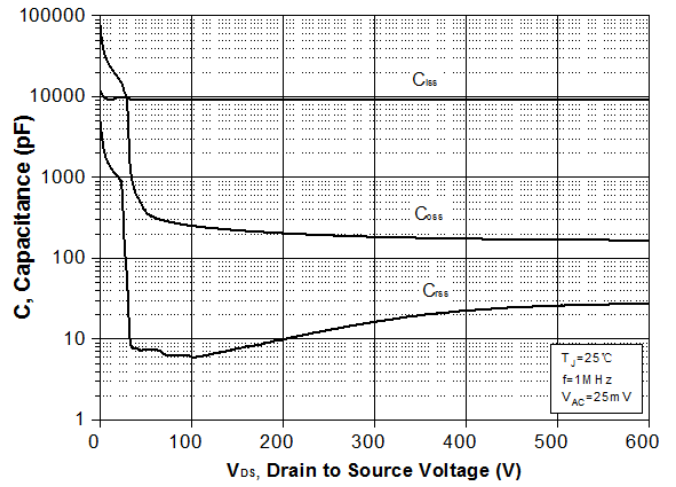
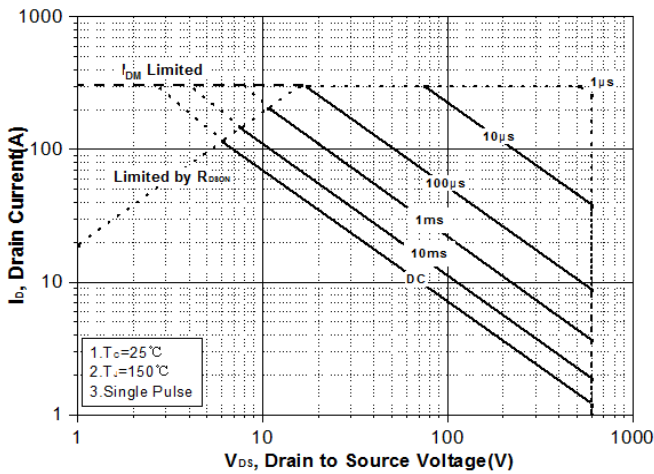


Fig 8. Capacitance Characteristics



**Fig 9. Safe operating area(TO-247)
Tc= 25°C**

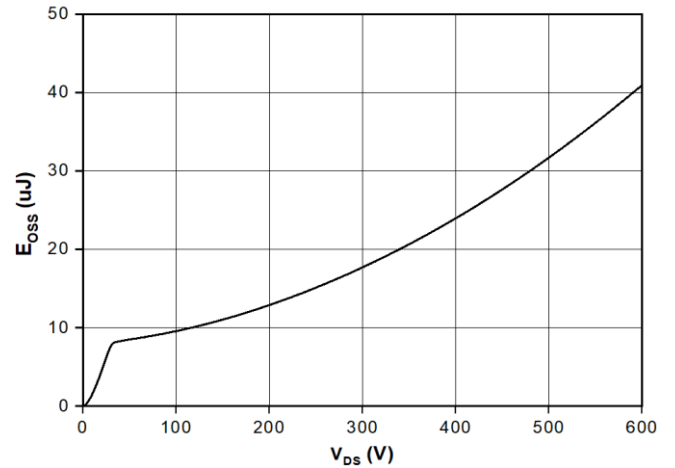


Fig 10 . E_{OSS} vs Drain-Source Voltage

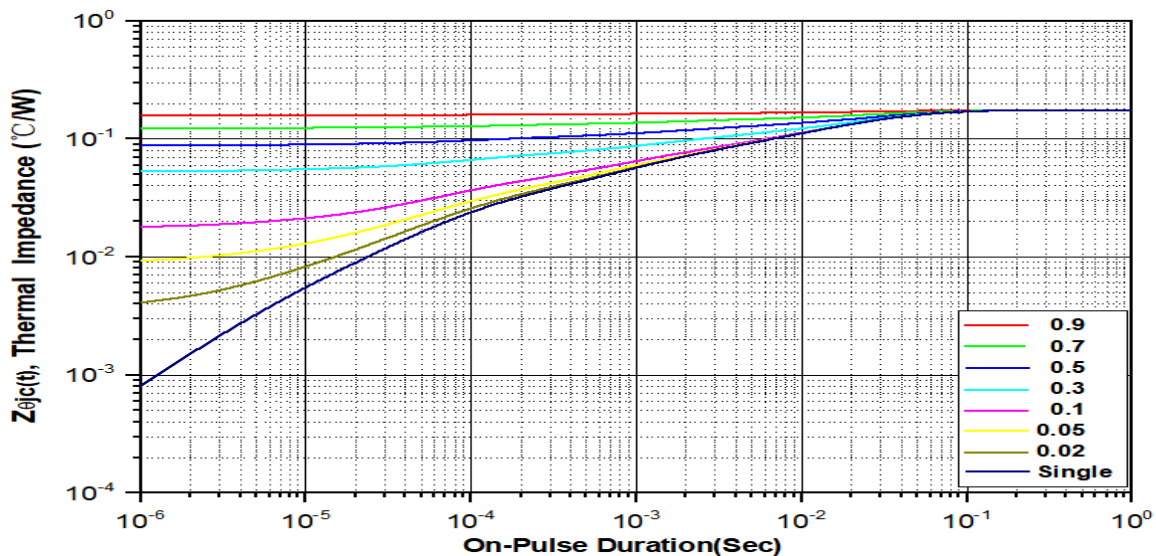
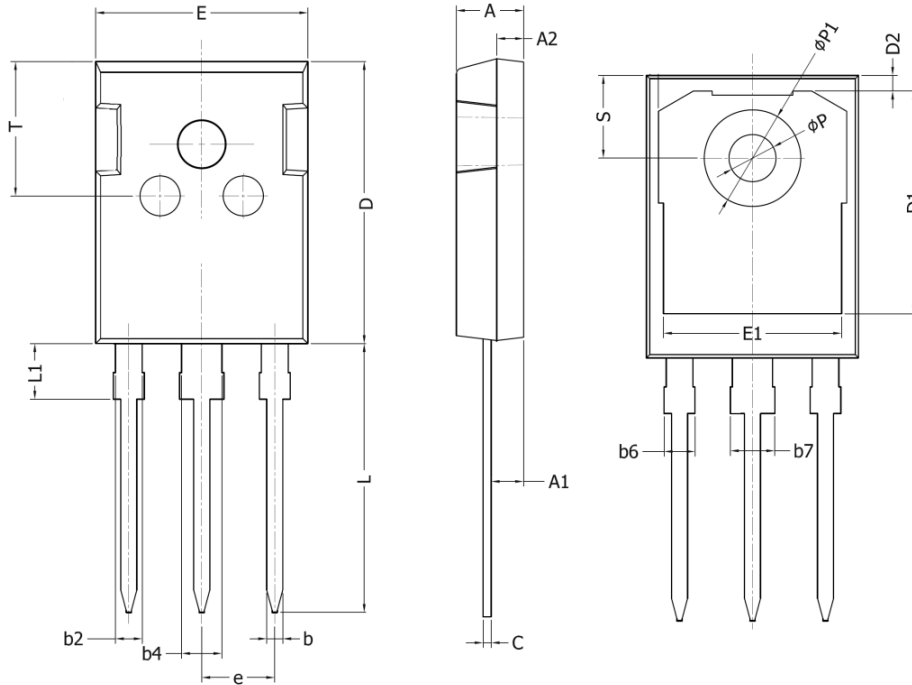


Fig 11. Transient thermal impedance

TO-247 Package Outline Dimensions



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.90	5.20
A1	2.31	2.51
A2	1.9	2.1
b	1.16	1.26
b2	1.96	2.06
b4	2.96	3.06
b6	-	2.25
b7	-	3.25
C	0.59	0.66
D	20.90	21.20
D1	16.25	16.85
D2	1.05	1.35
E	15.75	16.10
E1	13.00	13.60
e	5.436 BSC	
L	19.80	20.20
L1	-	4.30
P	3.40	3.60
P1	7.00	7.40
S	6.05	6.25
T	9.80	10.20