



Features

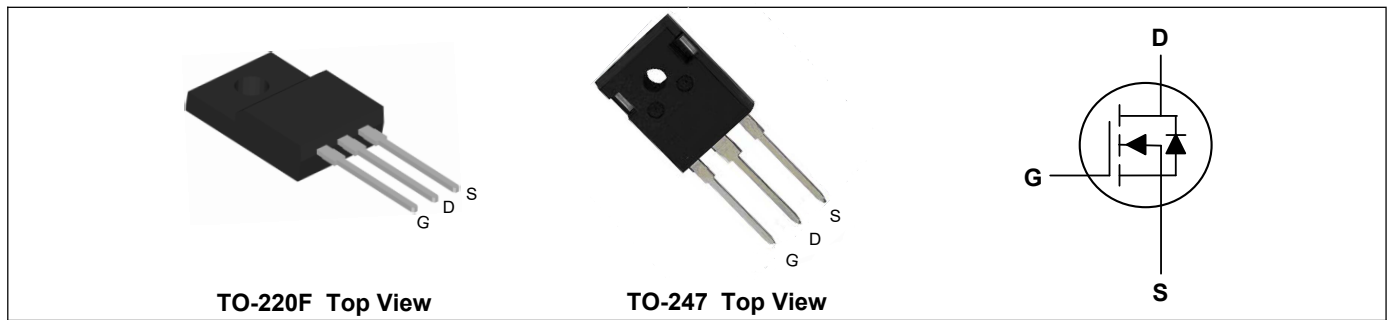
- Low drain-source on-resistance: $R_{DS(ON)}=0.074\Omega(\text{typ})$
- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Extremely low switching loss
- 100% avalanche tested
- RoHS compliant

Key Performance Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	600	V
$R_{DS(ON),max}$	82	m Ω
I_D	47	A
$Q_{g,typ}$	72	nC
I_{DM}	141	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	TO-220F	TO-247	Unit
Drain-Source Voltage	V_{DS}	600		V
Gate-Source Voltage	V_{GS}	± 30		V
Continuous Drain Current ¹	I_D	47		A
Pulsed Drain Current ²	I_{DM}	141		A
Single Pulse Avalanche Energy ⁴	EAS	1280		mJ
Avalanche Current	I_{AS}	10.5		A
Repetitive Avalanche Energy	E_{AR}	1.7		mJ
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400\text{V}$	dv/dt	50		V/ns
Reverse diode dv/dt ³ $V_{DS}=0 \dots 400\text{V}$, $I_{SD} \leq I_D$		50		
Total Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	40	391	W
Storage Temperature Range	T_{STG}	-55 to 150		$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to 150		$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	TO-220F	TO-247	Unit
Thermal Resistance Junction-Ambient (Max)	$R_{\theta JA}$	80	62	$^\circ\text{C/W}$
Thermal Resistance Junction-Case (Max)	$R_{\theta JC}$	3	0.32	$^\circ\text{C/W}$

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	600	---	---	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =23.5A	---	74	82	mΩ
Gate Threshold Voltage	V _{GS(th)}	V _{GS} =V _{DS} , I _D =1.24mA	2.5	3.5	4.5	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =600V, V _{GS} =0V, T _J =150°C	---	---	100	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	---	---	±100	nA
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.95	---	Ω
Total Gate Charge	Q _g	V _{DD} =480V, V _{GS} =10V, I _D =47A	---	72	---	nC
Gate-Source Charge	Q _{gs}		---	14	---	
Gate-Drain Charge	Q _{gd}		---	24	---	
Turn-On Delay Time	T _{d(on)}	V _{DD} =400V, R _G =1.9Ω, I _D =25.8A, V _{GS} =13V	---	15	---	ns
Rise Time	T _r		---	12	---	
Turn-Off Delay Time	T _{d(off)}		---	80	---	
Fall Time	T _f		---	6	---	
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, f=1MHz	---	3680	---	pF
Output Capacitance	C _{oss}		---	390	---	
Reverse Transfer Capacitance	C _{rss}		---	15	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	I _S	T _C =25°C	---	---	47	A
Pulsed Source Current	I _{SM}		---	---	141	A
Diode Forward Voltage	V _{SD}	V _G =0V, I _S =47A, T _J =25°C	---	0.9	1.2	V
Reverse Recovery Time	t _{rr}	V _R =400V, I _F =25.8 A, di _F /dt=100A/μs	---	518	---	ns
Reverse Recovery Charge	Q _{rr}		---	8	---	uC
Peak Reverse Recovery Current	I _{rrm}		---	26	---	A

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=25Ω, I_{AS}=10.5A, Starting T_J=25°C

Typical Characteristics

Figure 1. Output Characteristics

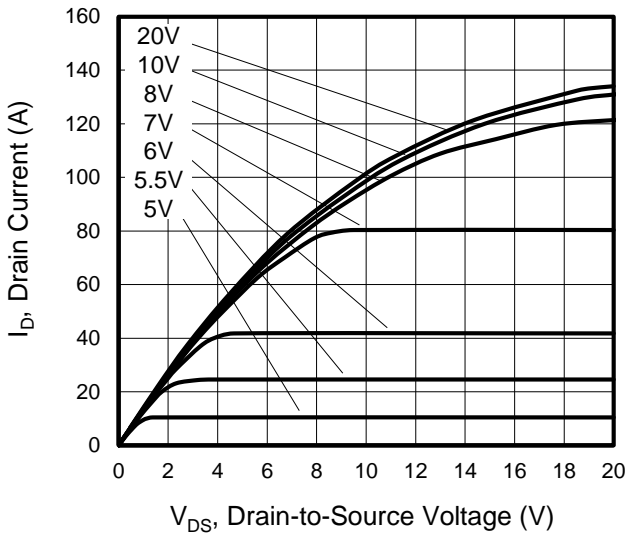


Figure 2. Transfer Characteristics

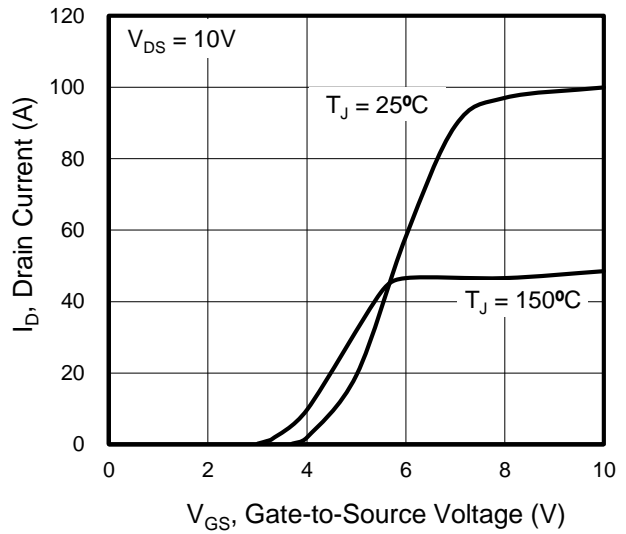


Figure 3. On-Resistance vs. Drain Current

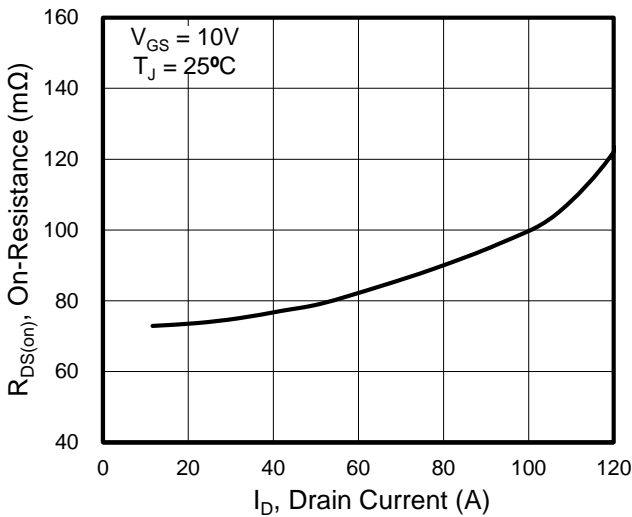


Figure 4. Capacitance

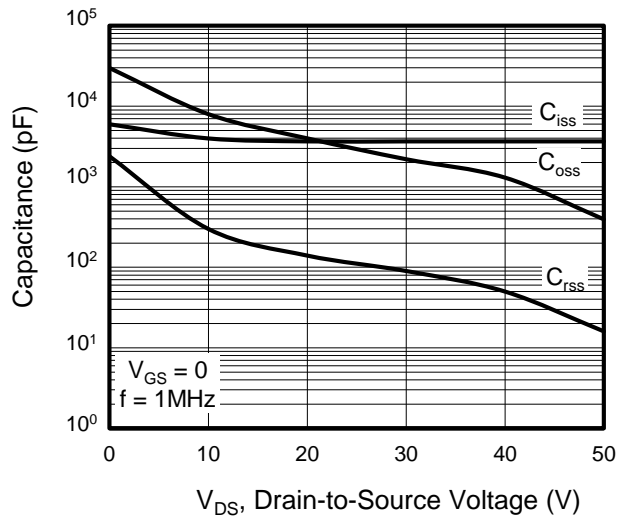


Figure 5. Gate Charge

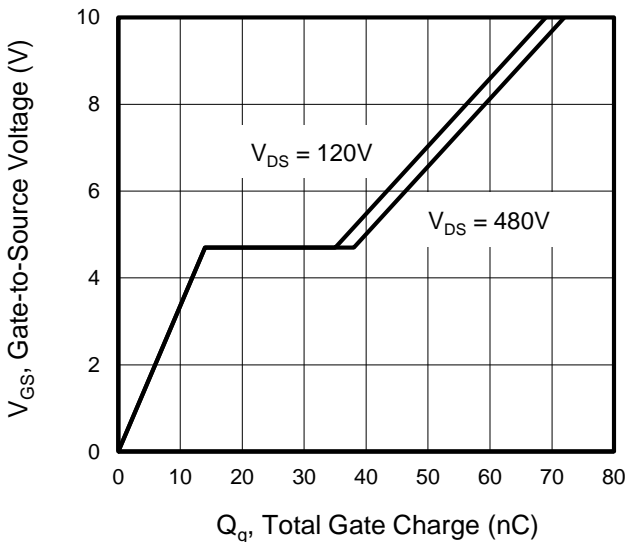


Figure 6. Body Diode Forward Voltage

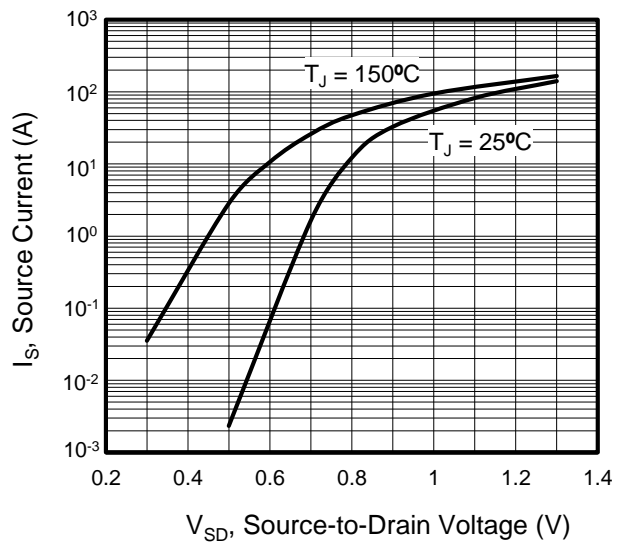


Figure 7. On-Resistance vs. Temperature

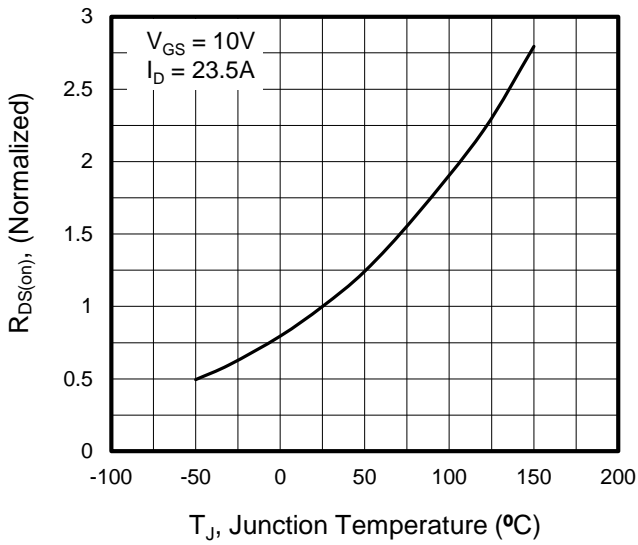


Figure 8. Threshold Voltage vs. Temperature

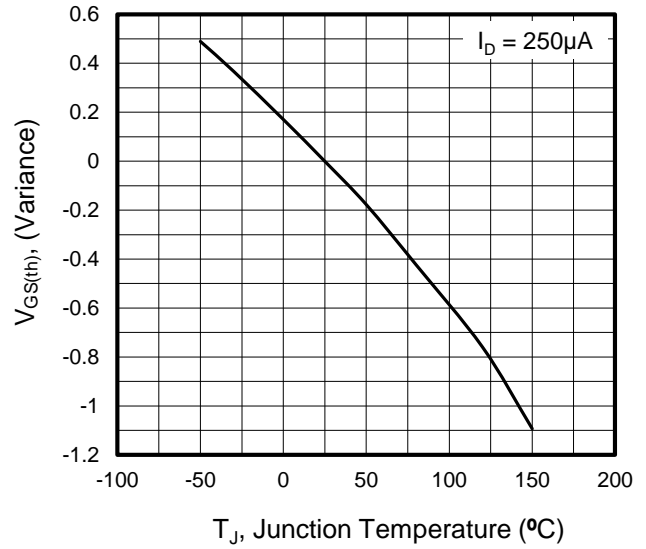


Figure 9. Transient Thermal Impedance TO-247

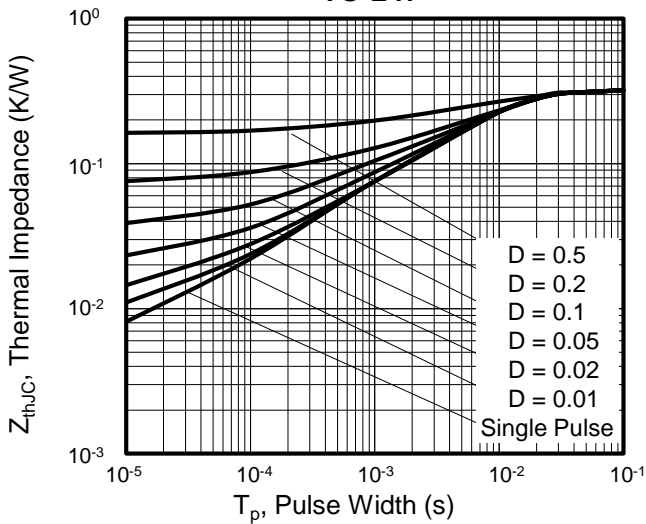
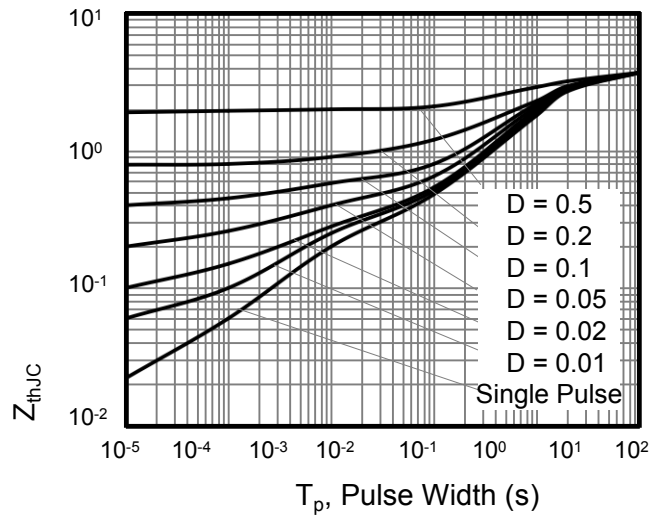
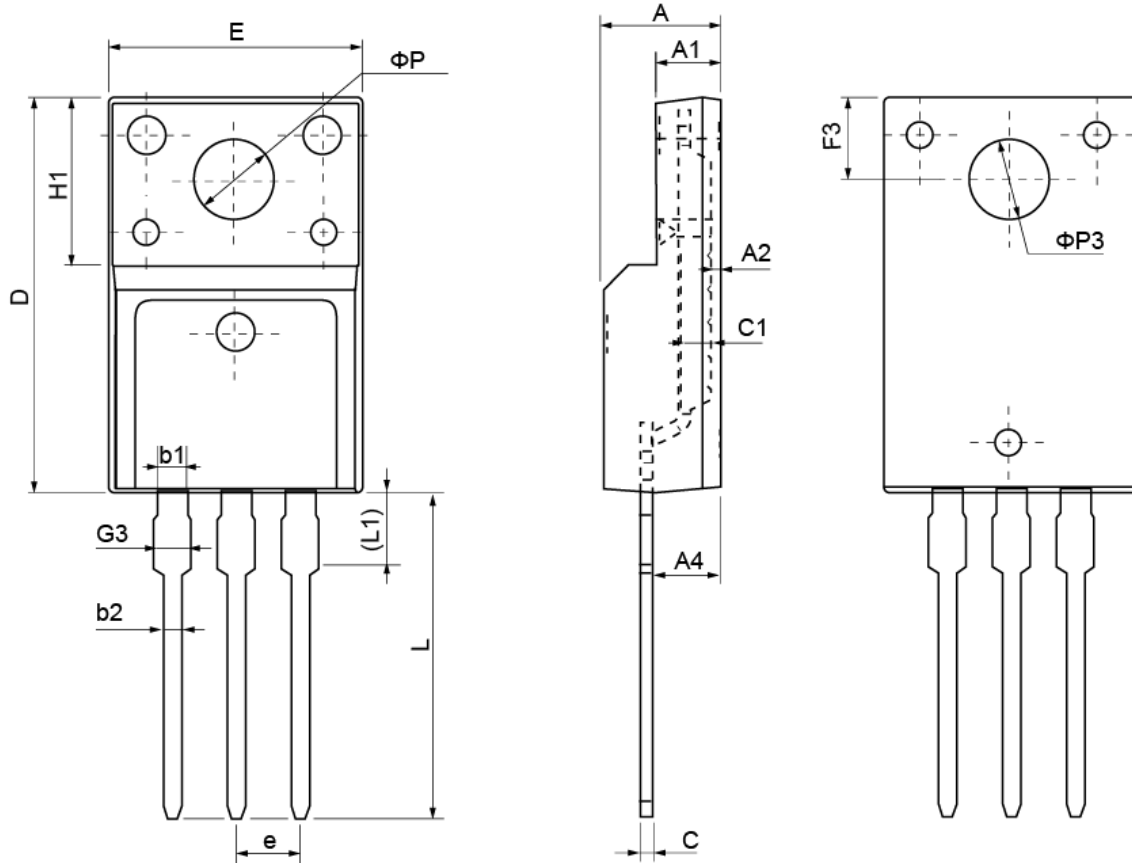


Figure 10. Transient Thermal Impedance TO-220F

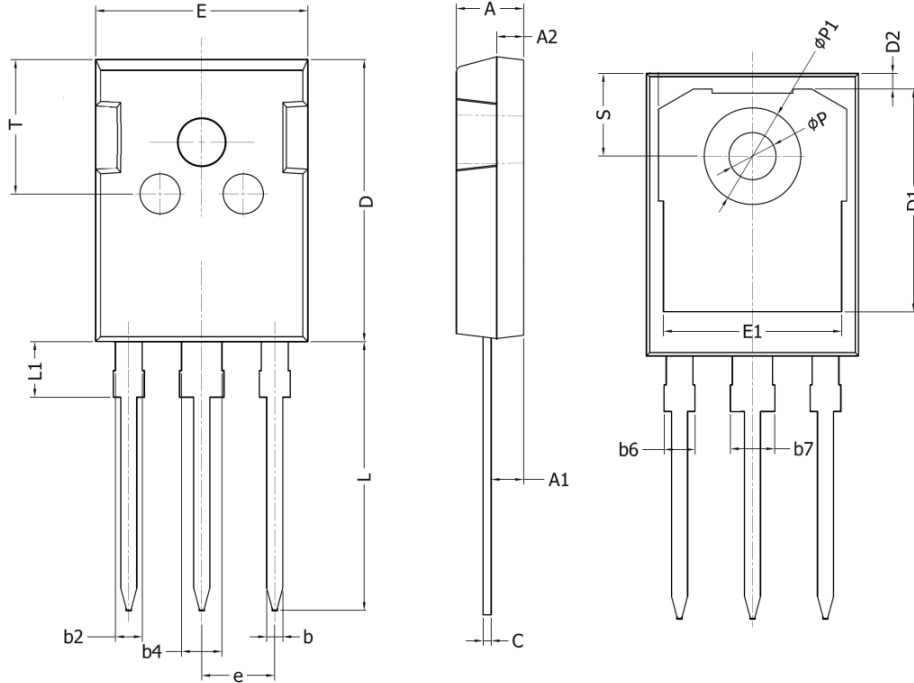


TO-220F Package Outline Dimensions



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	4.40	4.70	5.00	H1	6.70 REF		
A1	2.30	2.55	2.80	L	12.30	12.98	13.30
A2	0.30	0.50	0.70	L1	2.95	3.10	3.50
A4	2.45	2.80	3.05	φ P	3.03	3.20	3.50
c	0.30	0.50	0.70	φ P3	3.15	3.45	3.65
c1	1.20	1.30	1.40	b1	1.10	1.30	1.45
D	15.40	15.90	16.40	b2	0.60	0.80	1.00
E	9.86	10.16	10.46	F3	3.05	3.30	3.55
e	2.54 BSC			G3	1.15	1.35	1.55

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