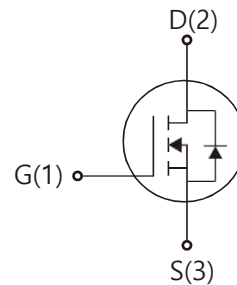
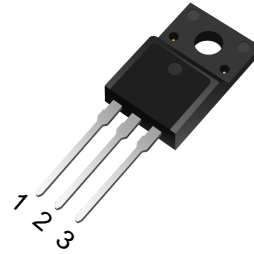


Features

- Super Junction technology
- Much lower Ron*A Performance for On-state efficiency
- Better efficiency due to very low FOM
- Ultra Low Gate Charge:Qg=26nC (Typ.)
- $V_{DSS}=650V$, $I_D=13A$
- $R_{ds(on)}:326m$ (Typ.) @ $V_G=10V$
- 100% Avalanche Tested

Package

TO-220F



- 1.Gate (G)
- 2.Drain (D)
- 3.Source (S)

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current $T_C = 25^\circ C$ $T_C = 100^\circ C$	I_D	13 8.0	A
Pulsed drain current ($T_C = 25^\circ C$, t_p limited by T_{jmax})	$I_{D\ pulse}$	52	A
Avalanche energy, single pulse ($L=30mH$, $R_g=50\Omega$)	E_{AS}	90	mJ
Gate-Source voltage	V_{GS}	± 30	V
Power dissipation ($T_C = 25^\circ C$)	P_{tot}	33	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	$^\circ C$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	5.04	$^\circ C/W$
Thermal resistance, junction – ambient. Max	R_{thJA}	56	



Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	3	-	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=650V, V_{GS}=0V$ $T_C=25^\circ C$ $T_C=150^\circ C$
Gate-source leakage current	I_{GSS}	-	0.3	100	nA	$V_{GS}=\pm 30V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	326	360	m Ω	$V_{GS}=10V, I_D=3A,$ $T_C=25^\circ C$ $T_C=150^\circ C$
Transconductance	g_{fs}	-	10	-	S	$V_{DS}=20V, I_D=6A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	742	-	pF	$V_{GS}=0V, V_{DS}=100V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	35	-		
Reverse Transfer Capacitance	C_{rss}	-	0.5	-		
Gate Total Charge	Q_G	-	26	-	nC	$V_{GS}=10V, V_{DS}=480V,$ $I_D=6A, f=1MHz$
Gate-Source charge	Q_{gs}	-	3.7	-		
Gate-Drain charge	Q_{gd}	-	13.8	-		
Turn-on delay time	$t_{d(on)}$	-	20	-	ns	$T_j=25^\circ C, V_{GS}=10V,$ $I_D=6A, V_{DS}=400V,$ $R_g=27\Omega$
Rise time	t_r	-	26	-		
Turn-off delay time	$t_{d(off)}$	-	105	-		
Fall time	t_f	-	32	-		
Gate resistance	R_G	-	9.3	-	Ω	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	0.5	0.83	1	V	$V_{GS}=0V, I_{SD}=6A$
Body Diode Reverse Recovery Time	t_{rr}	-	210	-	ns	$I_{sd}=6A$ $dI/dt=100A/\mu s, V_{ds}=100V$
Body Diode Reverse Recovery Charge	Q_{rr}	-	2.05	-	μC	

Typical Performance Characteristics

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

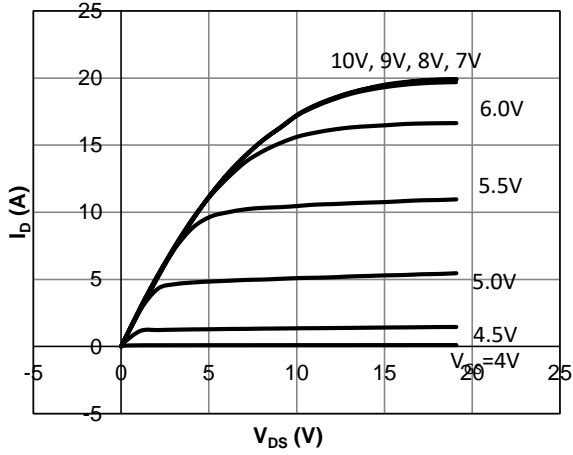


Fig 2. Output Characteristics (Tj=150°C)

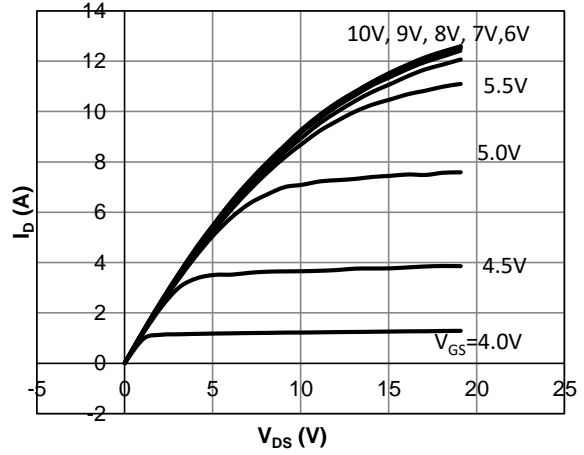


Fig 3: Transfer Characteristics

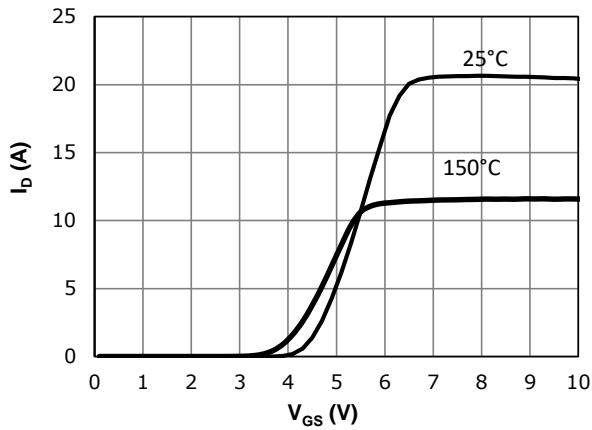


Fig 4: V_{TH} Vs Tj Temperature Characteristics

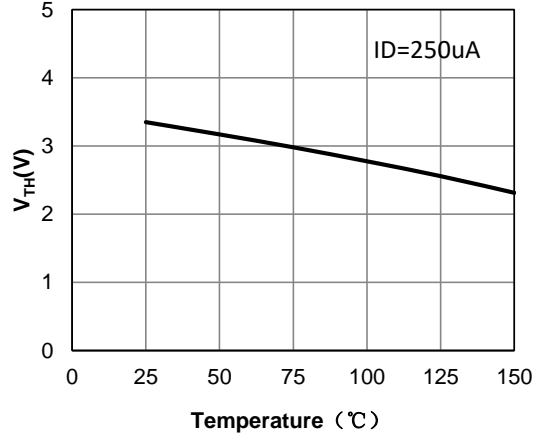


Fig 5: $R_{DS(on)}$ Vs I_{DS} Characteristics (Tc=25°C)

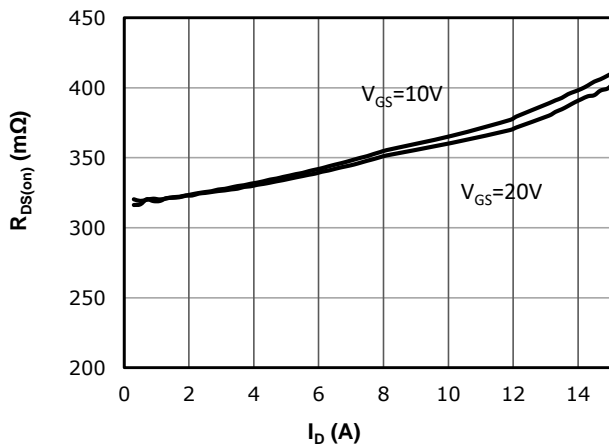


Fig 6: $R_{DS(on)}$ vs. Temperature

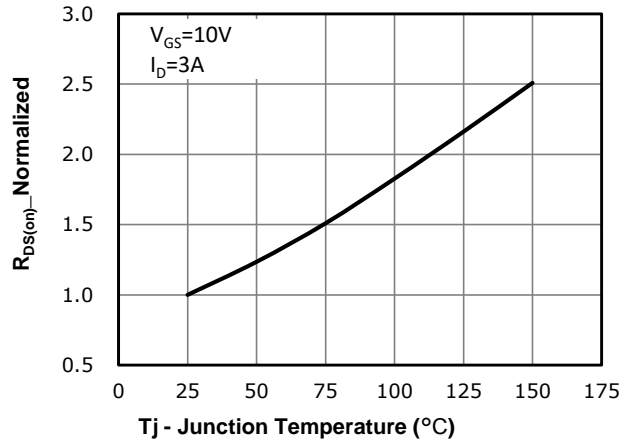


Fig 7: BVdss vs. Temperature

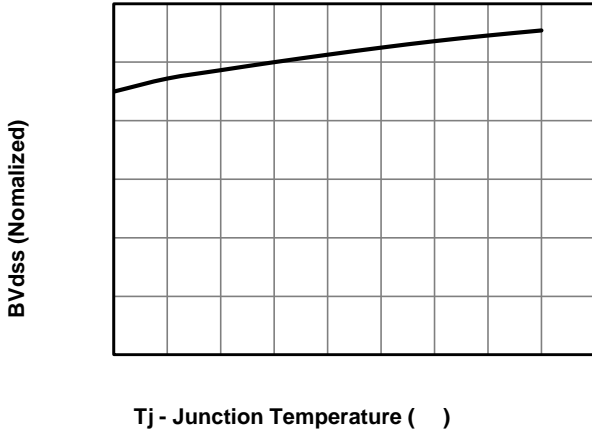


Fig 8: Rds(on) vs Gate Voltage

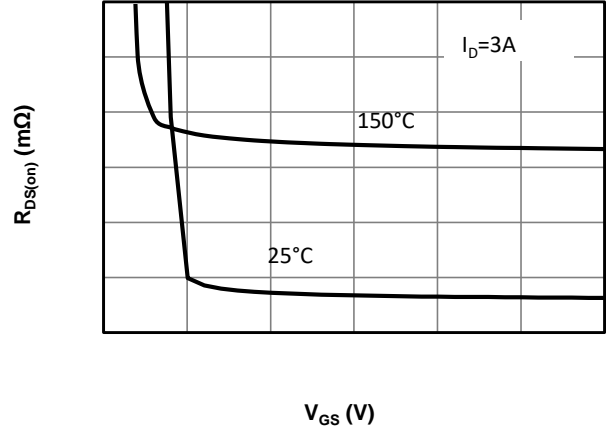


Fig 9: Body-diode Forward Characteristics

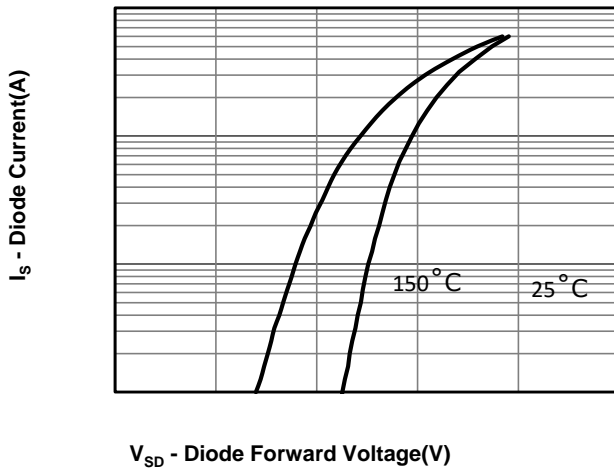


Fig 10: Gate Charge Characteristics

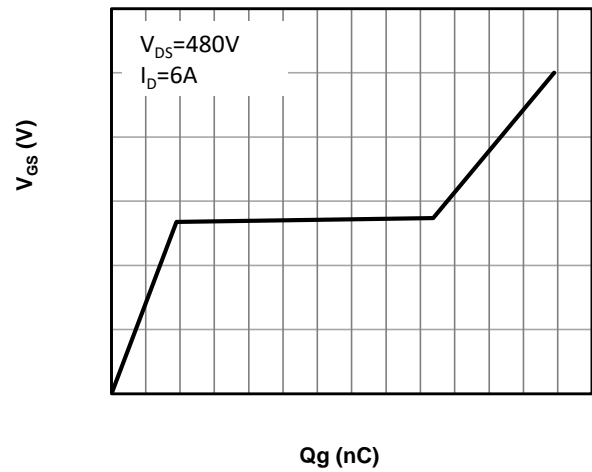


Fig 11: Capacitance Characteristics

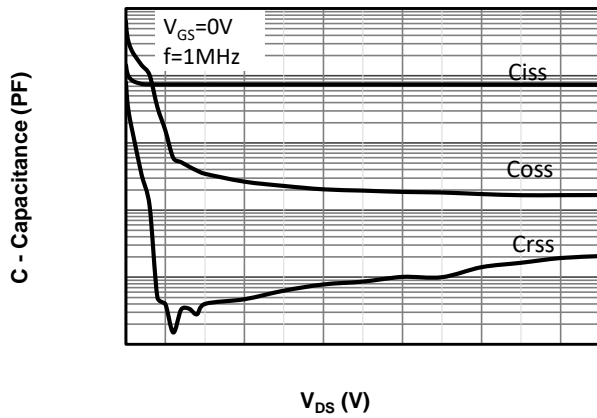


Fig 12: Safe Operating Area

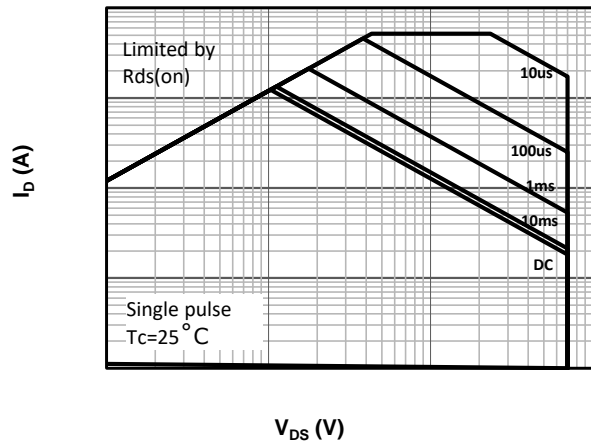
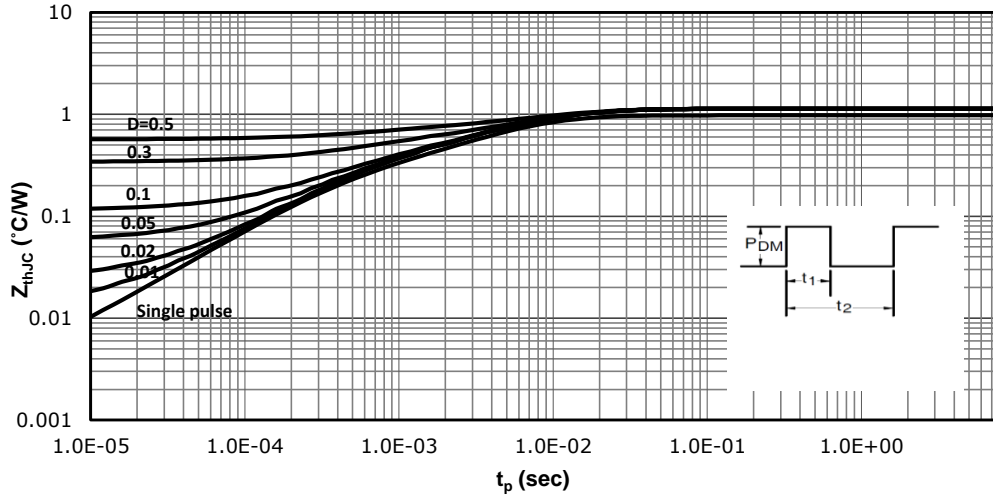
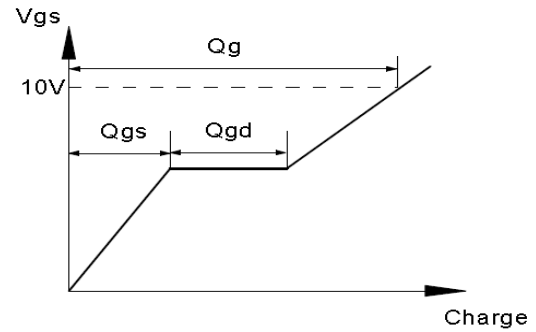
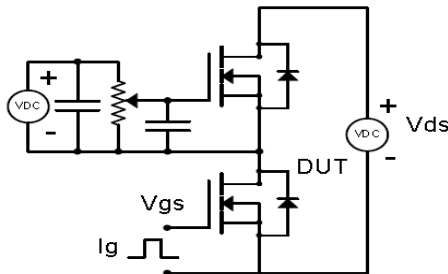


Fig 13: Max. Transient Thermal Impedance

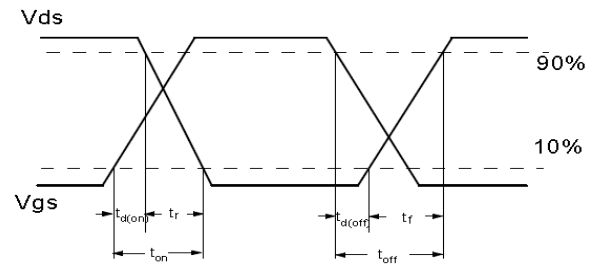
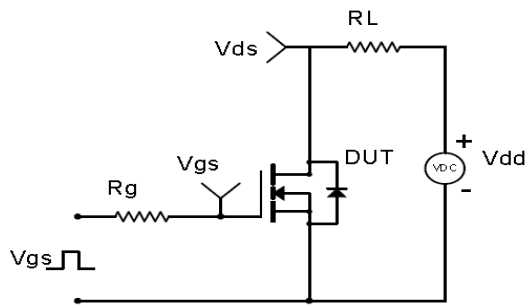


Test Circuit & Waveform

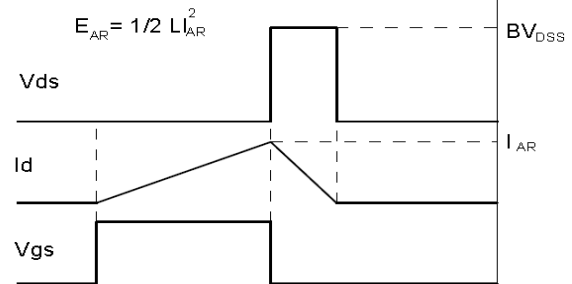
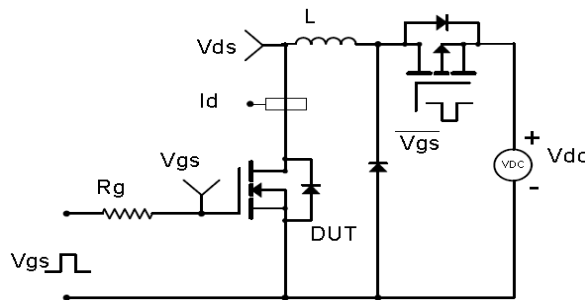
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

