

N-Channel 650-V (D-S) MOSFET

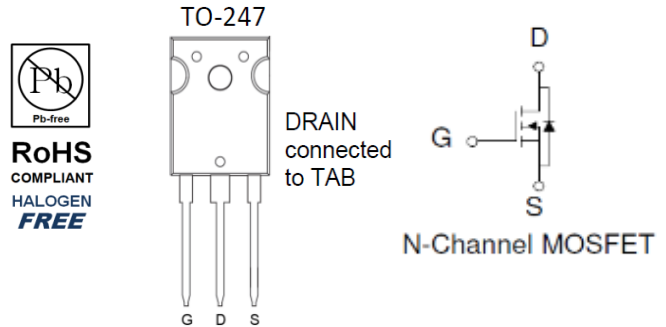
Key Features:

- Low $r_{DS(on)}$ technology
- Low thermal impedance
- Fast switching speed

Typical Applications:

- Power Supplies
- Motor Drives
- Consumer Electronics

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (m Ω)	I_D (A)
650	380 @ $V_{GS} = 10V$	30



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Limit	Units
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current ^a	I_D	30	A
Pulsed Drain Current ^b	I_{DM}	120	
Continuous Source Current (Diode Conduction) ^a	I_S	30	A
Power Dissipation ^a	P_D	500	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient ^c	$R_{\theta JA}$	40	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	0.29	

Notes

- Package Limited
- Pulse width limited by maximum junction temperature
- Surface Mounted on 1" x 1" FR4 Board.

Electrical Characteristics

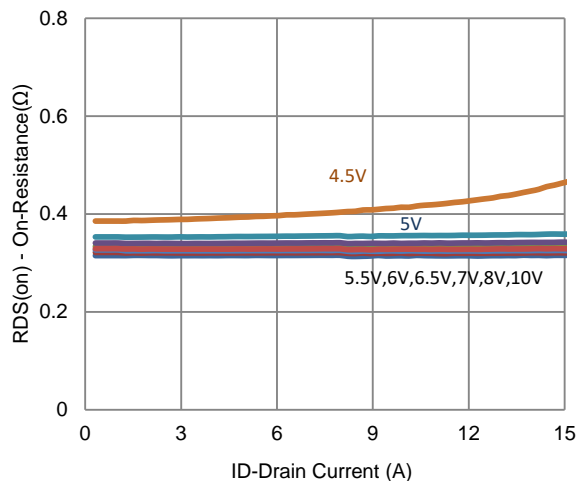
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 30 V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 520 V, V_{GS} = 0 V$			1	uA
		$V_{DS} = 520 V, V_{GS} = 0 V, T_J = 55^\circ C$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = 5 V, V_{GS} = 10 V$	40			A
Drain-Source On-Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10 V, I_D = 15 A$			380	mΩ
Forward Transconductance ^a	g_{fs}	$V_{DS} = 50 V, I_D = 15 A$		12		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 15 A, V_{GS} = 0 V$		1		V
Dynamic ^b						
Total Gate Charge	Q_g	$V_{DS} = 325 V, V_{GS} = 10 V,$ $I_D = 15 A$		20		nC
Gate-Source Charge	Q_{gs}			4.7		
Gate-Drain Charge	Q_{gd}			7.7		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = 325 V, R_L = 21.7 \Omega,$ $I_D = 15 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$		10		ns
Rise Time	t_r			12		
Turn-Off Delay Time	$t_{d(off)}$			96		
Fall Time	t_f			57		
Input Capacitance	C_{iss}	$V_{DS} = 50, V_{GS} = 0 V, f = 1 Mhz$		777		pF
Output Capacitance	C_{oss}			128		
Reverse Transfer Capacitance	C_{rss}			13		

Notes

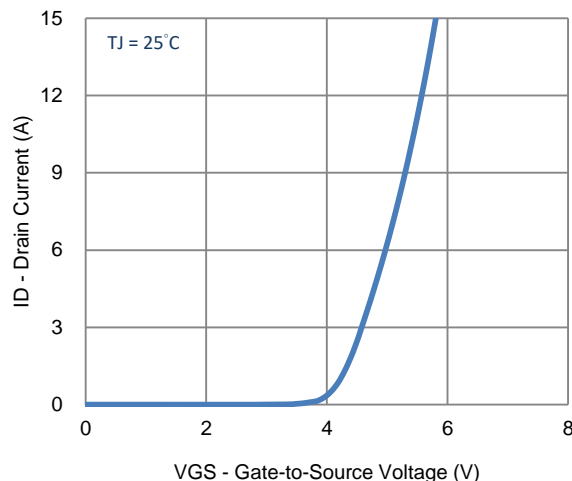
- Pulse test: PW ≤ 300us duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.

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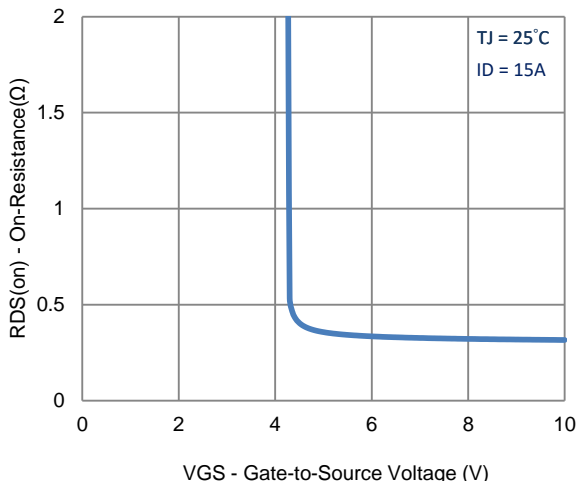
Typical Electrical Characteristics



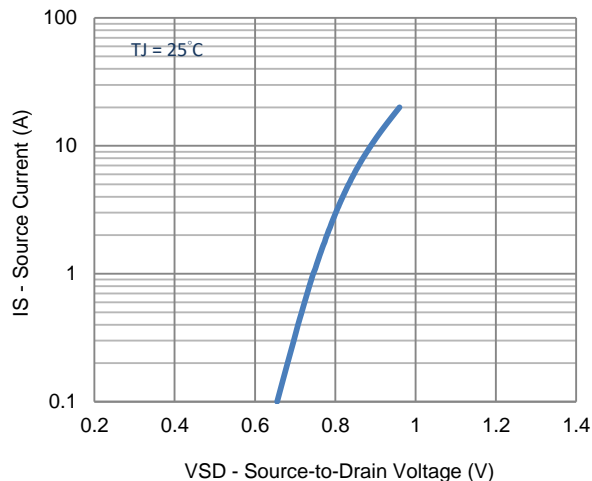
1. On-Resistance vs. Drain Current



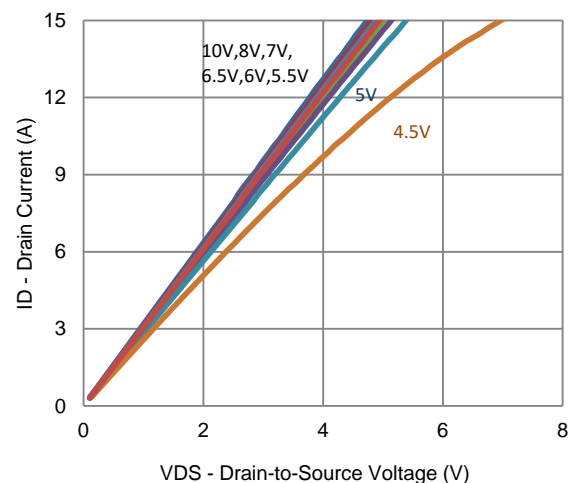
2. Transfer Characteristics



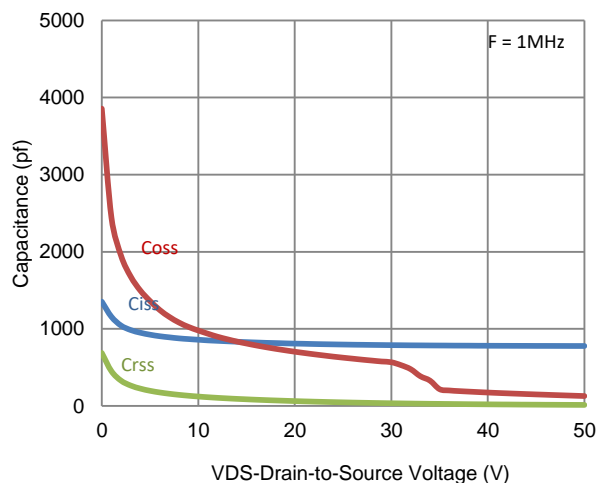
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

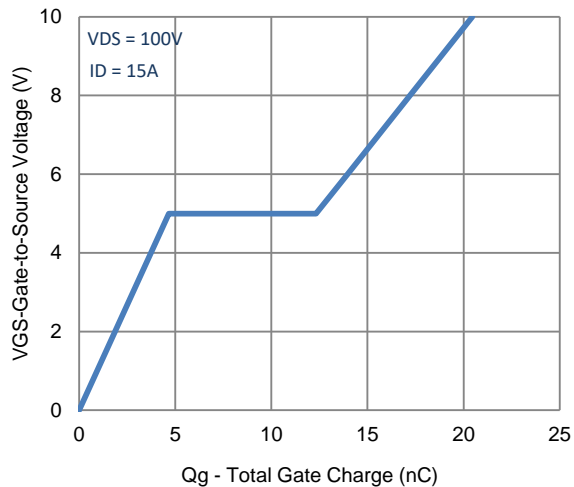


5. Output Characteristics

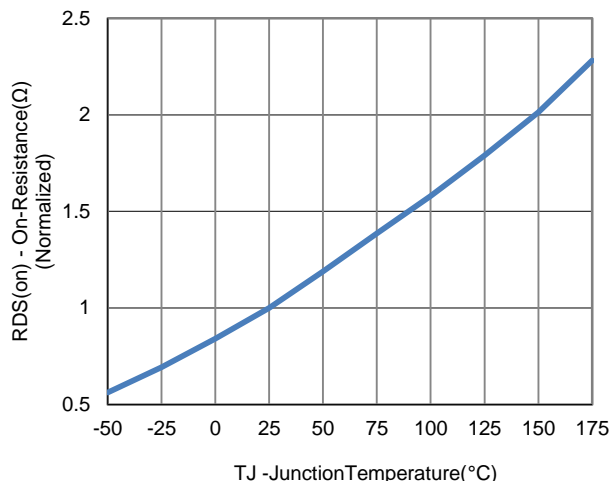


6. Capacitance

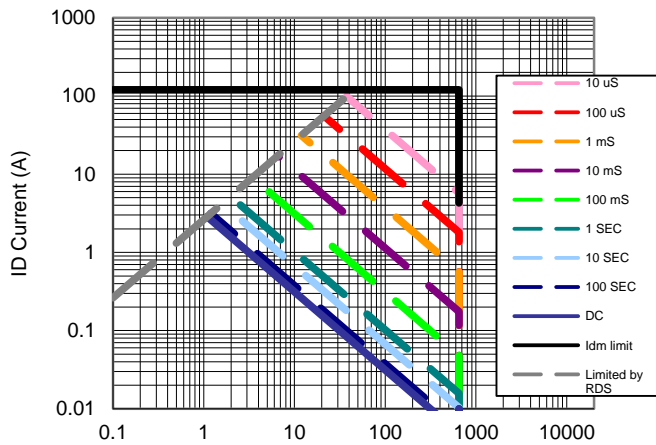
Typical Electrical Characteristics



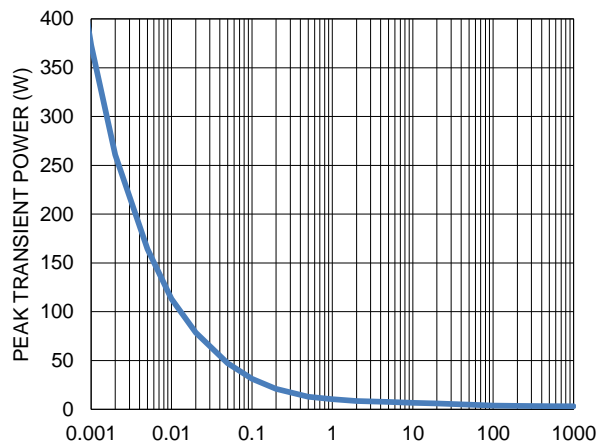
7. Gate Charge



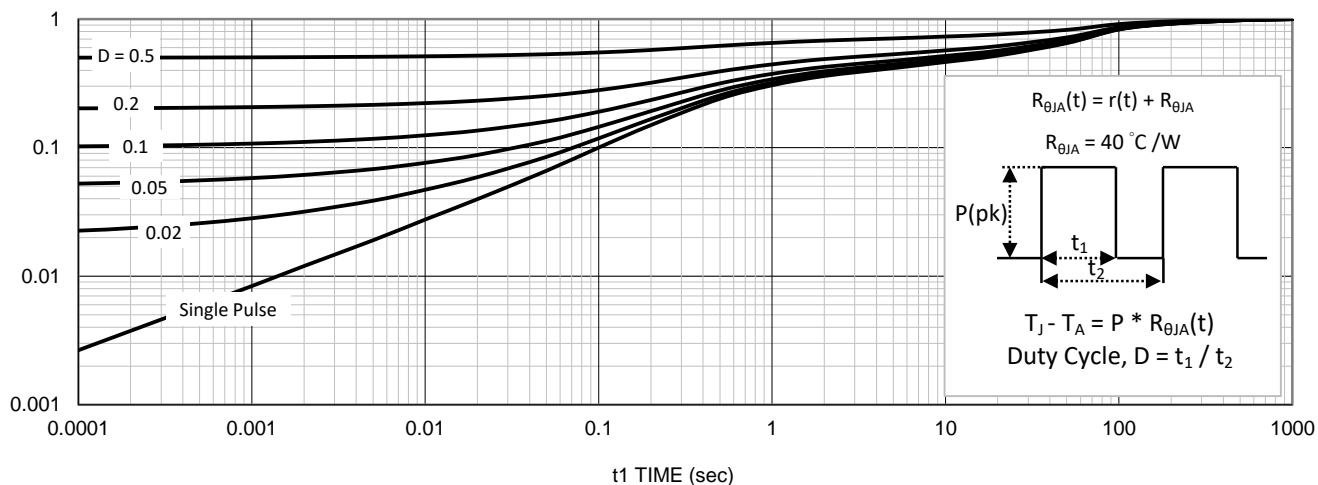
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

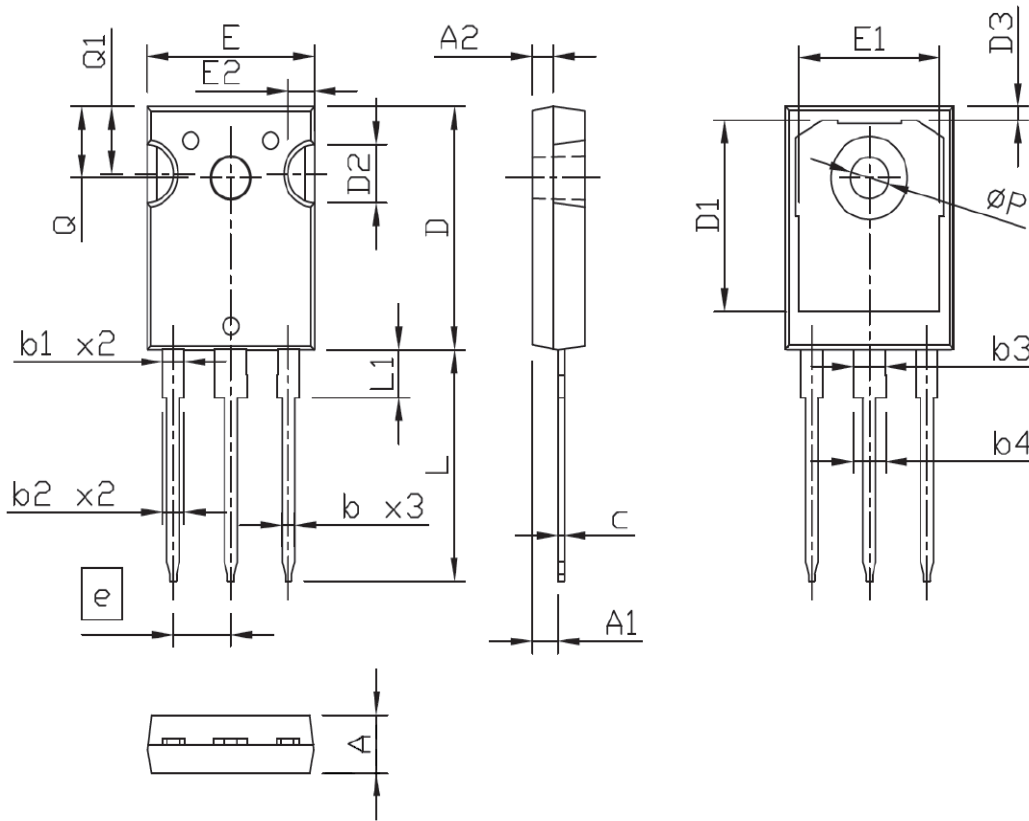


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.32	2.42	2.52
A2	1.90	2.00	2.10
b	1.17	1.22	1.27
b1	1.97	2.02	2.07
b2	2.00	2.10	2.20
b3	2.97	3.02	3.07
b4	3.00	3.10	3.20
c	0.59	0.62	0.66
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	5.00 TYP		
D3	1.05	1.20	1.35
e	5.44 BSC		
E	15.70	15.80	15.90
E1	13.06	13.26	13.46
E2	2.50 TYP		
L	19.72	19.92	20.12
L1	---	---	4.30
Q	6.15 BSC		
Q1	5.60	5.80	6.00
ØP	3.55	3.60	3.65