

## N-Channel 60-V (D-S) MOSFET

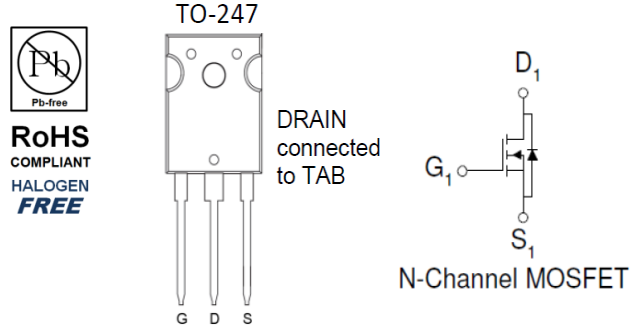
### Key Features:

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

### Typical Applications:

- Automotive Systems
- DC/DC Conversion Circuits
- Battery Powered Power Tools

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
60	8.5 @ $V_{GS} = 10V$	110 <sup>a</sup>
	11 @ $V_{GS} = 4.5V$	



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Units
Drain-Source Voltage		$V_{DS}$	60	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$T_C = 25^\circ C$	$I_D$	110	A
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	520	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$T_C = 25^\circ C$	$I_S$	110	A
Power Dissipation <sup>a</sup>	$T_C = 25^\circ C$	$P_D$	500	W
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 175	$^\circ C$

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient <sup>c</sup>	$R_{\theta JA}$	40	$^\circ C/W$
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

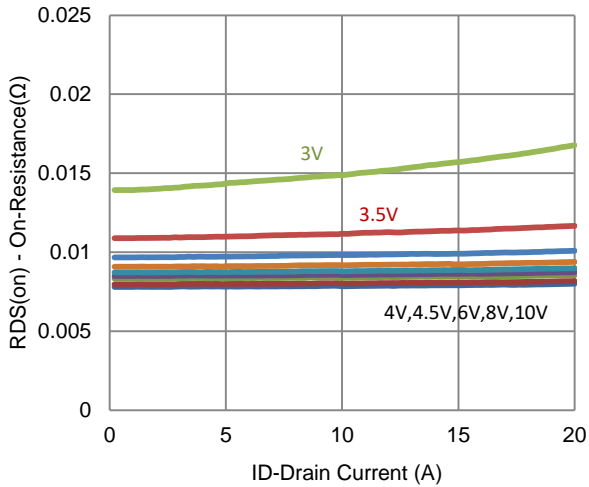
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 48 V, V_{GS} = 0 V$			1	uA
		$V_{DS} = 48 V, V_{GS} = 0 V, T_J = 55^\circ C$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5 V, V_{GS} = 10 V$	150			A
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10 V, I_D = 20 A$			8.5	mΩ
		$V_{GS} = 4.5 V, I_D = 16 A$			11	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15 V, I_D = 20 A$		63		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 20 A, V_{GS} = 0 V$		0.85		V
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 30 V, V_{GS} = 4.5 V,$ $I_D = 20 A$		32		nC
Gate-Source Charge	$Q_{gs}$			11		
Gate-Drain Charge	$Q_{gd}$			9.6		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = 30 V, R_L = 1.5 \Omega,$ $I_D = 20 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$		11		ns
Rise Time	$t_r$			10		
Turn-Off Delay Time	$t_{d(off)}$			111		
Fall Time	$t_f$			31		
Input Capacitance	$C_{iss}$	$V_{DS} = 15 V, V_{GS} = 0 V, f = 1 \text{ Mhz}$		4107		pF
Output Capacitance	$C_{oss}$			222		
Reverse Transfer Capacitance	$C_{rss}$			179		

## Notes

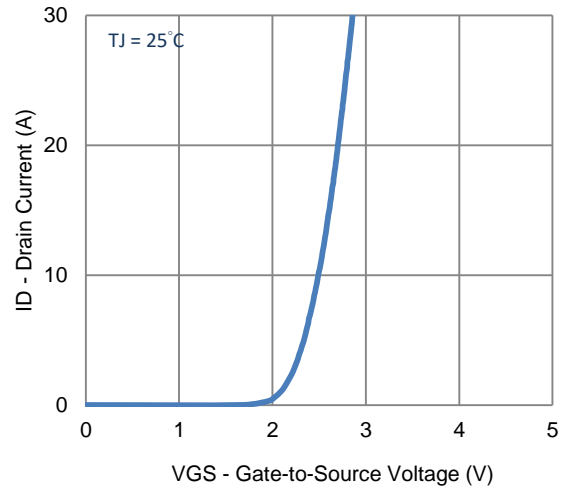
- Pulse test:  $PW \leq 300 \mu s$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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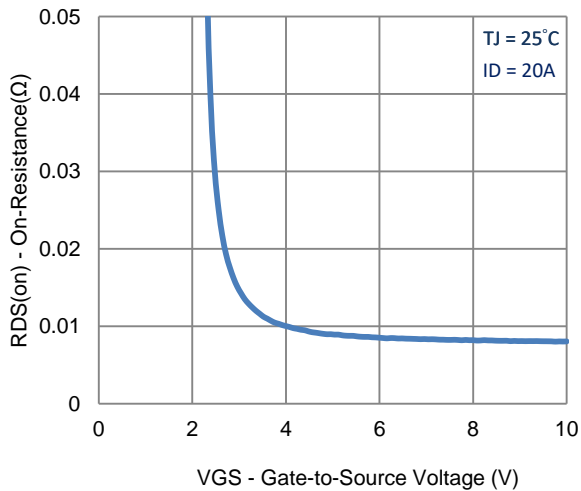
Typical Electrical Characteristics



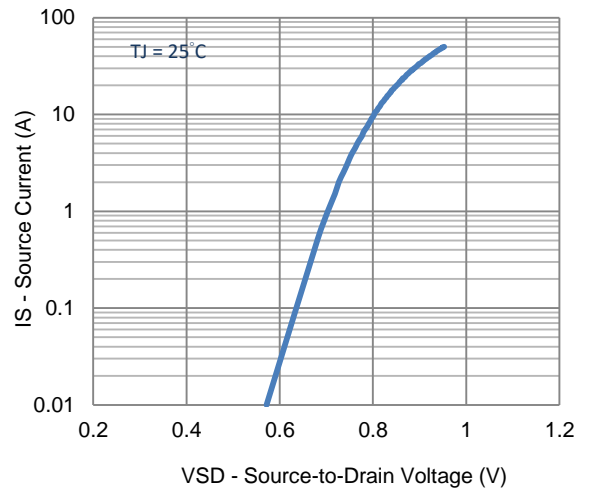
1. On-Resistance vs. Drain Current



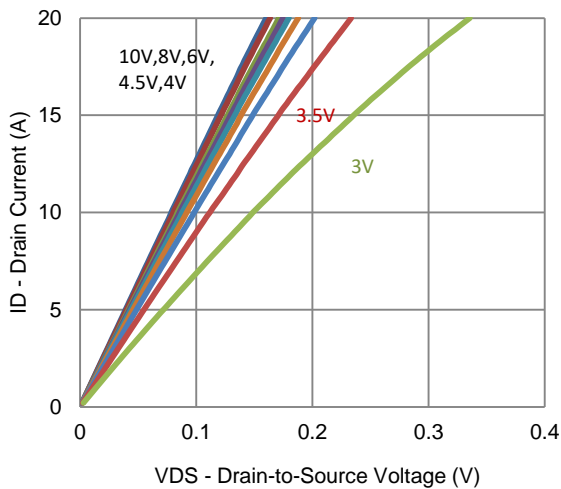
2. Transfer Characteristics



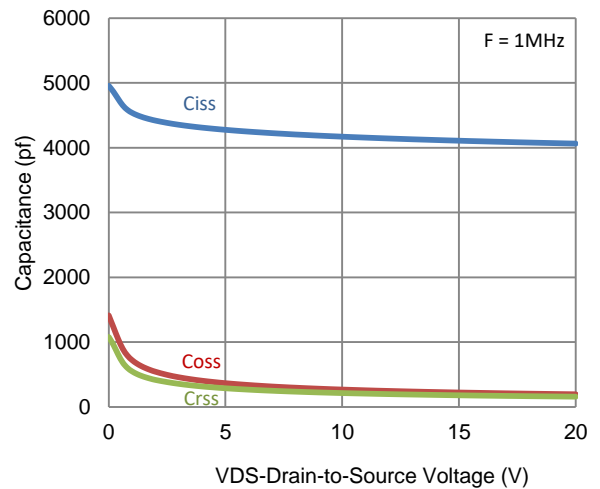
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

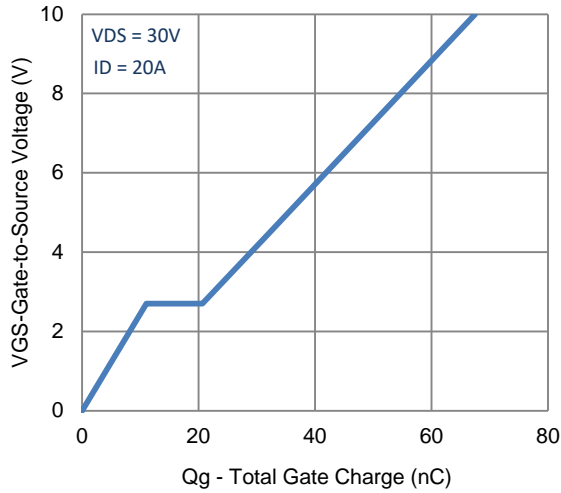


5. Output Characteristics

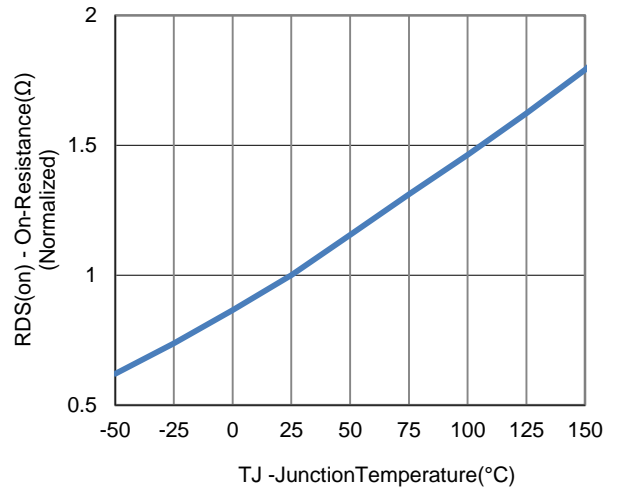


6. Capacitance

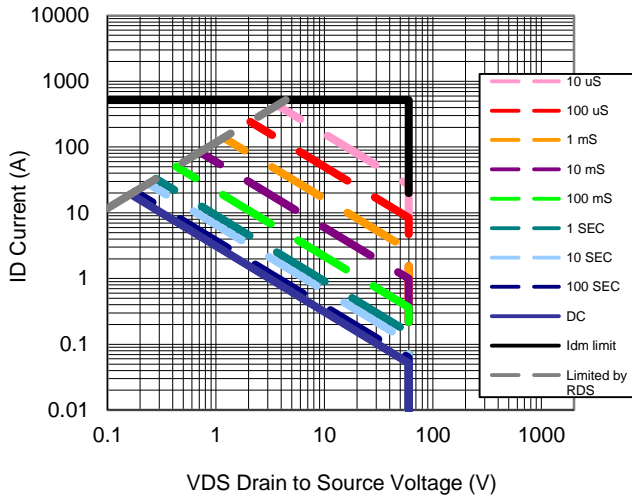
Typical Electrical Characteristics



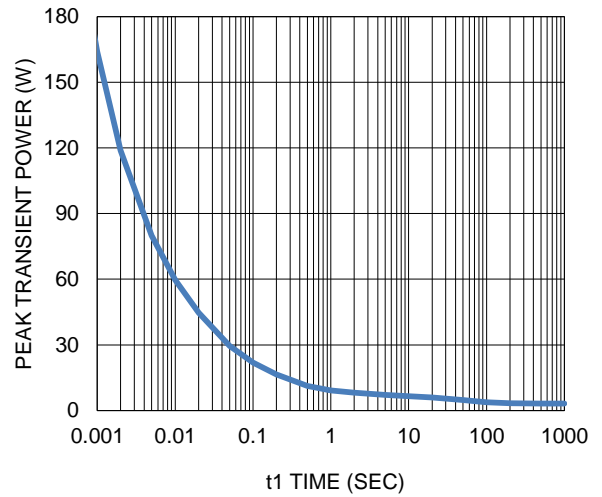
7. Gate Charge



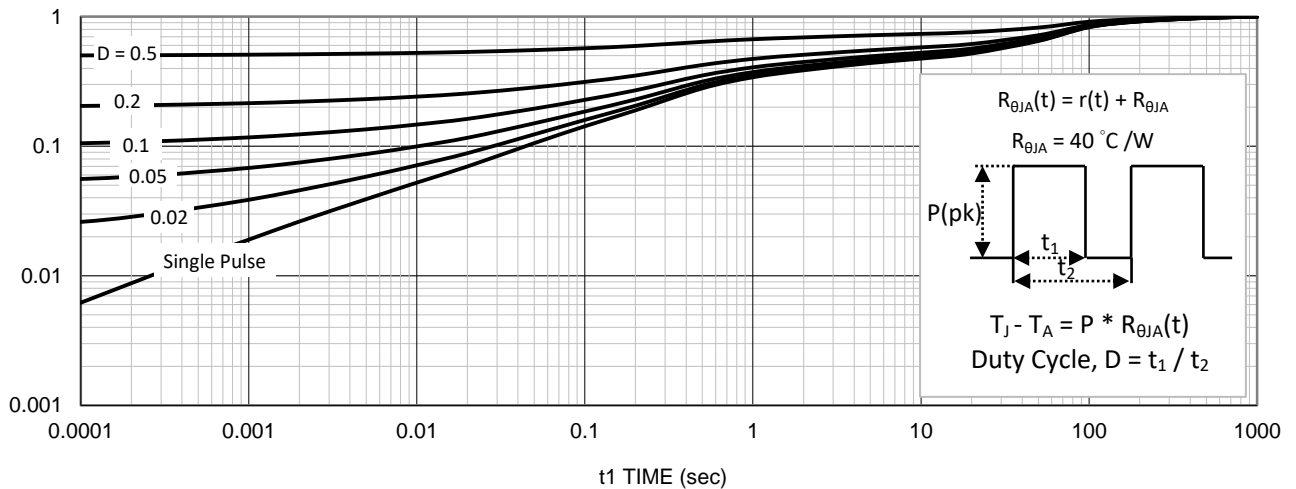
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

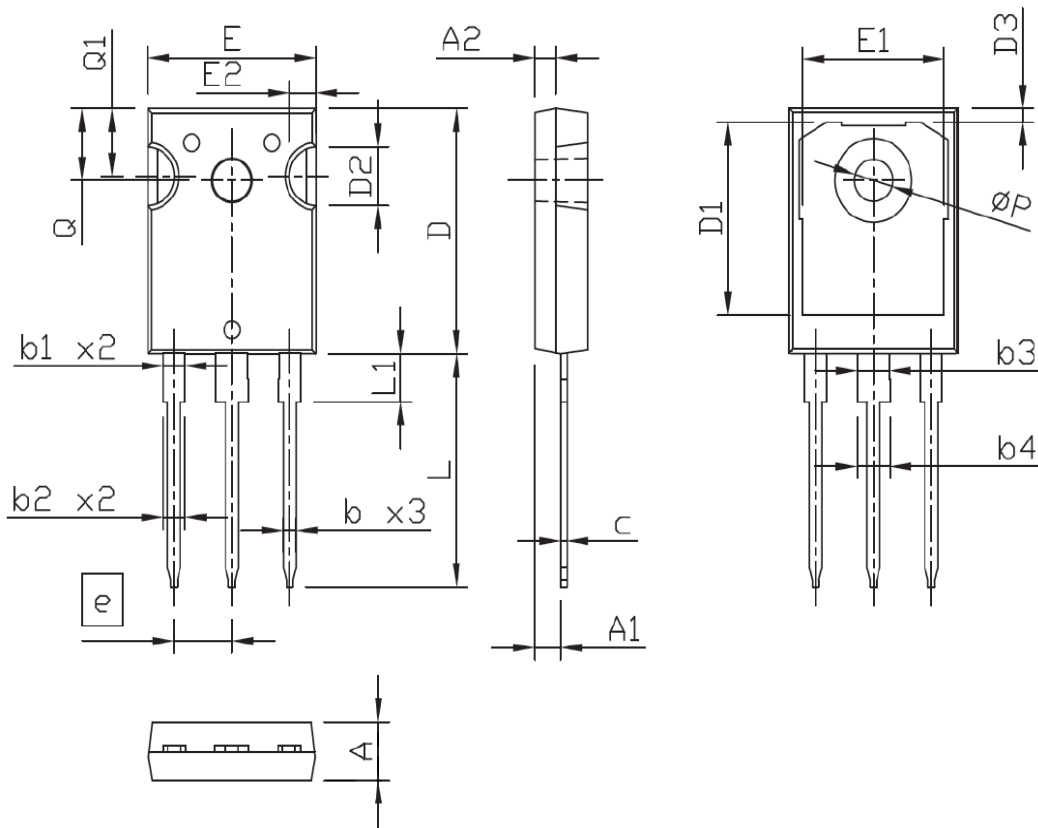


10. Single Pulse Maximum Power Dissipation



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