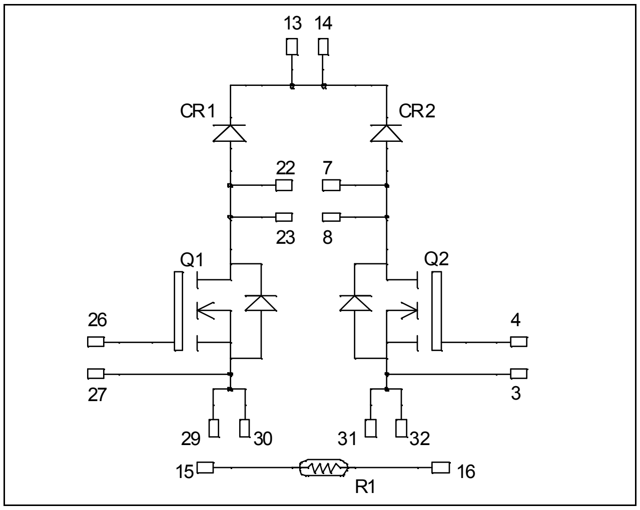
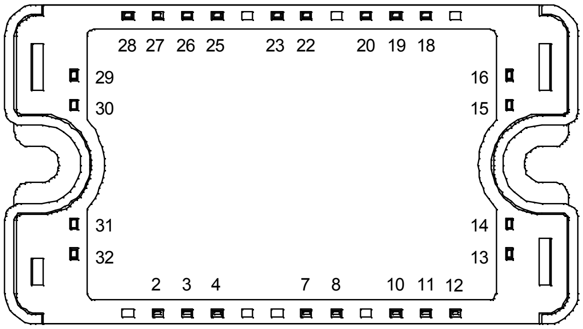
APTM100DDA35T3

Dual Boost chopper MOSFET Power Module

V_{DSS} = 1000V
R_{DSon} = 350mΩ max @ Tj = 25°C
I_D = 22A @ Tc = 25°C





All multiple inputs and outputs must be shorted together
Example: 13/14 ; 29/30 ; 22/23 …

Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

Features

- Power MOS 7® MOSFETs
  - Low R_{DSon}
  - Low input and Miller capacitance
  - Low gate charge
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
- Internal thermistor for temperature monitoring
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- Each leg can be easily paralleled to achieve a single boost of twice the current capability

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		1000	V
I_D	Continuous Drain Current	T_c = 25°C	22	A
		T_c = 80°C	17	
I_{DM}	Pulsed Drain current		88	
V_{GS}	Gate - Source Voltage		±30	V
R_{DSon}	Drain - Source ON Resistance		350	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	390	W
I_{AR}	Avalanche current (repetitive and non repetitive)		25	A
E_{AR}	Repetitive Avalanche Energy		50	mJ
E_{AS}	Single Pulse Avalanche Energy		3000	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handing Procedures Should Be Followed.

All ratings @ $T_j = 25°C$ unless otherwise specified

Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
BV_{DSS}	Drain - Source Breakdown Voltage	$V_{GS} = 0V$, $I_D = 250\mu A$		1000			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1000V$	$T_j = 25°C$			250	µA
		$V_{GS} = 0V, V_{DS} = 800V$	$T_j = 125°C$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V$, $I_D = 11A$				350	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 2.5mA$		3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V$, $V_{DS} = 0V$				±100	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*	*Min*	*Typ*	*Max*	*Unit*
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ f = 1MHz		5.2		nF
C_{oss}	Output Capacitance			0.88		
C_{rss}	Reverse Transfer Capacitance			0.16		
Q_g	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 500V$ $I_D = 22A$		186		nC
Q_{gs}	Gate – Source Charge			24		
Q_{gd}	Gate – Drain Charge			122		
$T_{d(on)}$	Turn-on Delay Time	**Inductive switching @ 125°C** $V_{GS} = 15V$ $V_{Bus} = 670V$ $I_D = 22A$ $R_G = 5\Omega$		18		ns
T_r	Rise Time			12		
$T_{d(off)}$	Turn-off Delay Time			155		
T_f	Fall Time			40		
E_{on}	Turn-on Switching Energy ❶	**Inductive switching @ 25°C** $V_{GS} = 15V$, $V_{Bus} = 670V$ $I_D = 22A$, $R_G = 5\Omega$		900		µJ
E_{off}	Turn-off Switching Energy ❷			623		
E_{on}	Turn-on Switching Energy ❶	**Inductive switching @ 125°C** $V_{GS} = 15V$, $V_{Bus} = 670V$ $I_D = 22A$, $R_G = 5\Omega$		1423		µJ
E_{off}	Turn-off Switching Energy ❷			779		

Diode ratings and characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1000			V
I_{RM}	Maximum Reverse Leakage Current	V_R=1000V	$T_j = 25°C$			250	µA
			$T_j = 125°C$			750	
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle	$T_c = 70°C$		30		A
V_F	Diode Forward Voltage	$I_F = 30A$			1.9	2.3	V
		$I_F = 60A$			2.2		
		$I_F = 30A$	$T_j = 125°C$		1.7		
t_{rr}	Reverse Recovery Time	$I_F = 30A$ $V_R = 667V$ di/dt=200A/µs	$T_j = 25°C$		290		ns
			$T_j = 125°C$		390		
Q_{rr}	Reverse Recovery Charge		$T_j = 25°C$		670		nC
			$T_j = 125°C$		2350		

❶ E_{on} includes diode reverse recovery.

❷ In accordance with JEDEC standard JESD24-1.

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case		IGBT			0.32	°C/W
			Diode			1.2	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T_J	Operating junction temperature range			-40		150	°C
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4			4.7	N.m
Wt	Package Weight					110	g

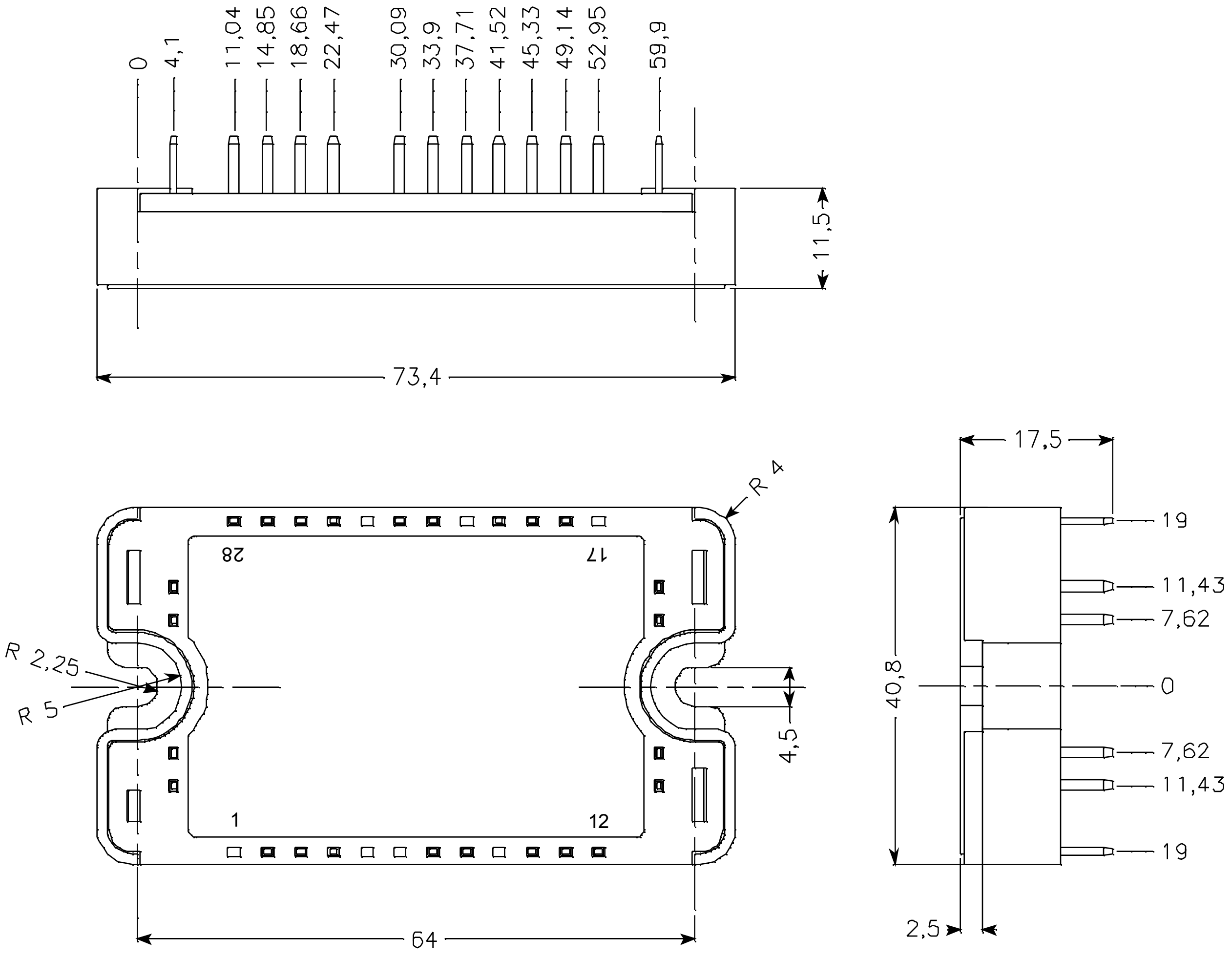
Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C		68		kΩ
$B_{25/85}$	T_{25} = 298.16 K		4080		K

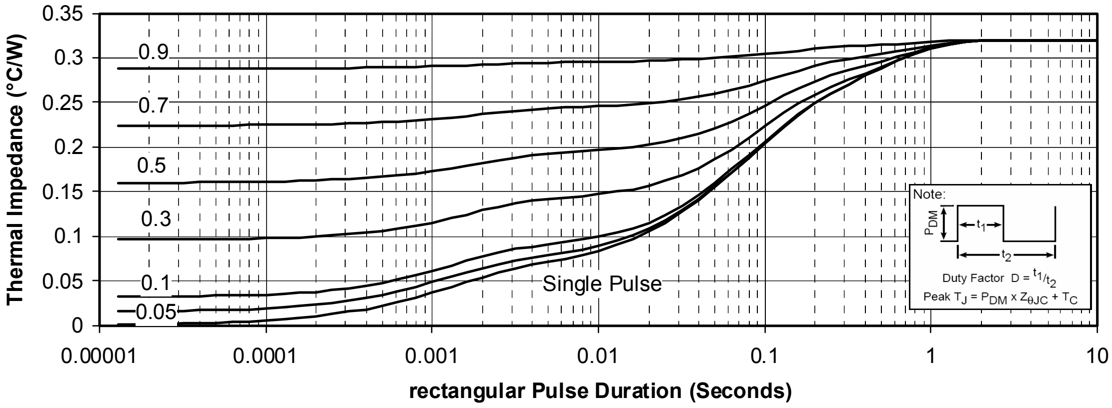
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

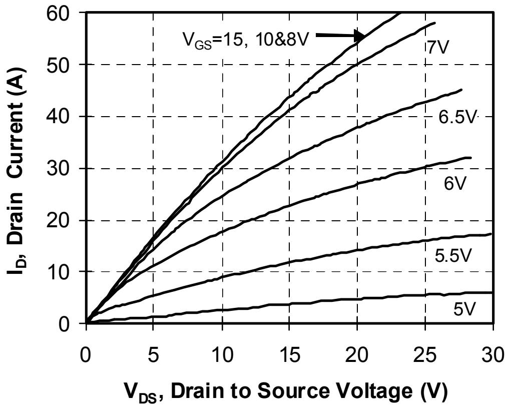
T: Thermistor temperature
R_T: Thermistor value at T

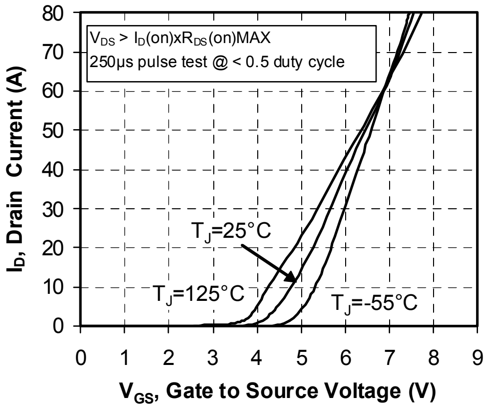
Package outline

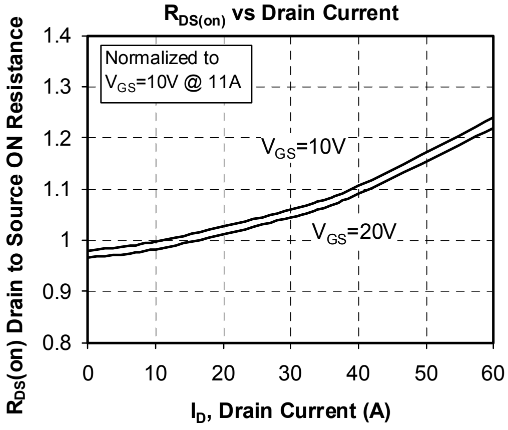


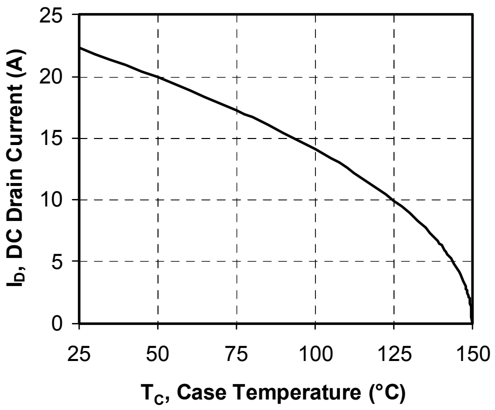
Typical Performance Curve

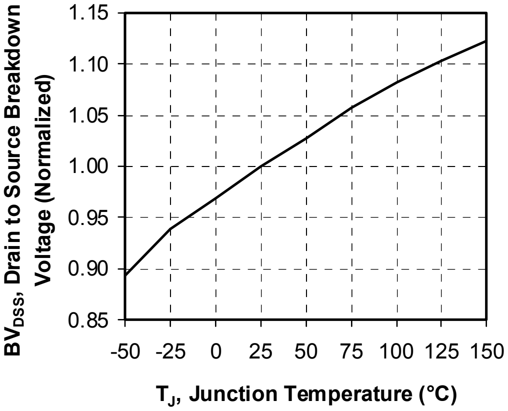

Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration


Low Voltage Output Characteristics

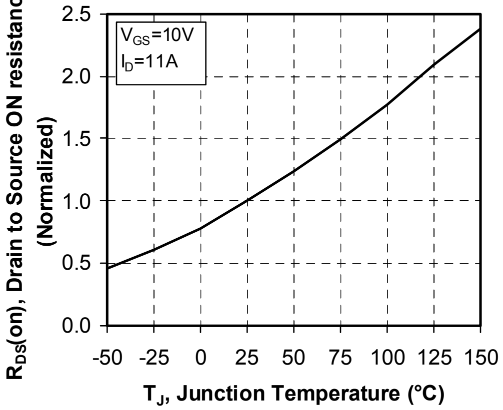

Transfert Characteristics


$R_{DS(on)}$ vs Drain Current

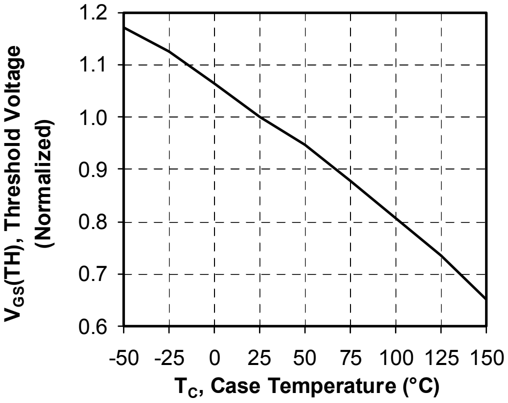

DC Drain Current vs Case Temperature



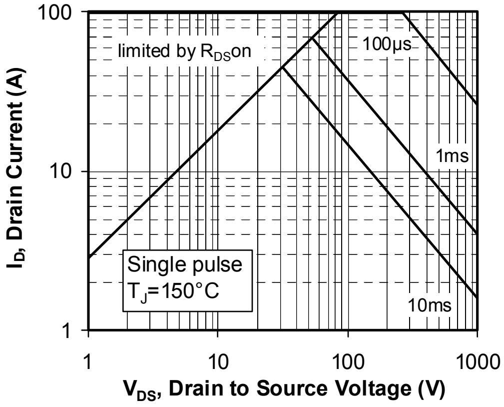
Breakdown Voltage vs Temperature



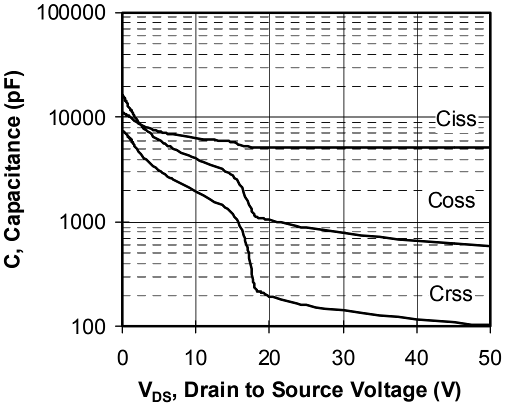
ON resistance vs Temperature



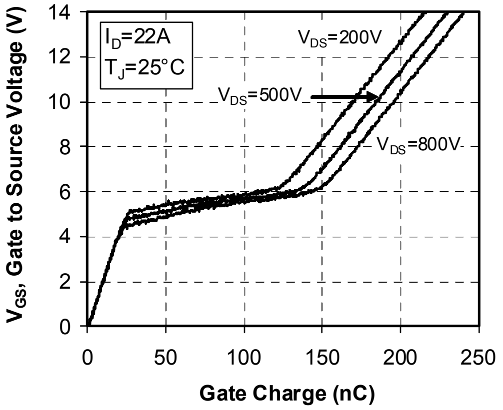
Threshold Voltage vs Temperature



Maximum Safe Operating Area

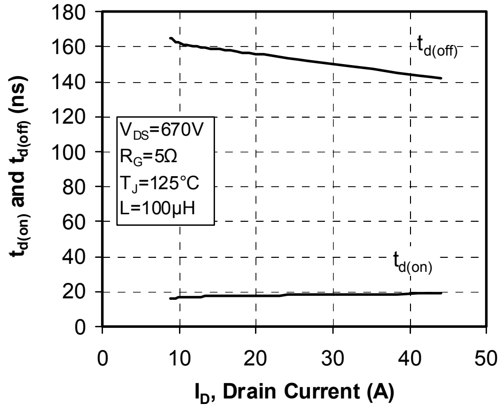


Capacitance vs Drain to Source Voltage

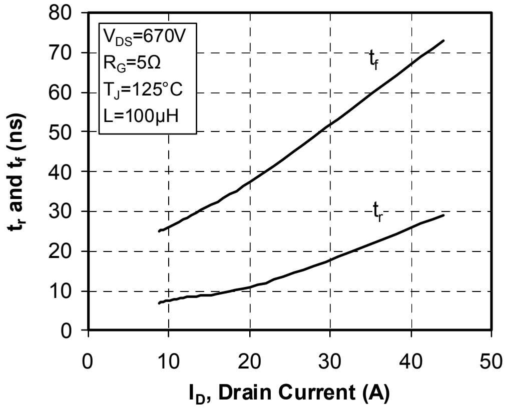


Gate Charge vs Gate to Source Voltage

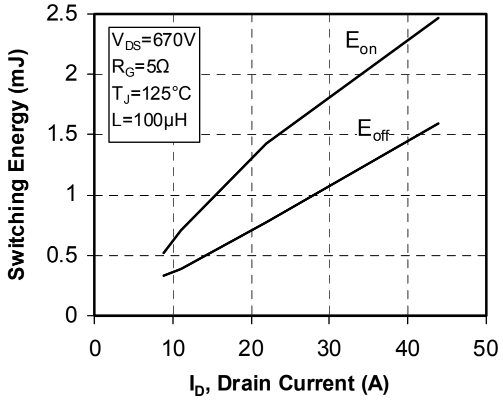
Delay Times vs Current



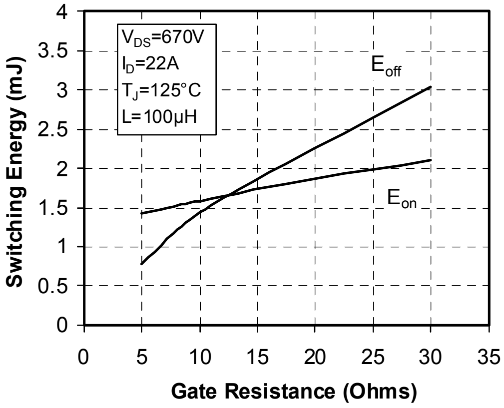
Rise and Fall times vs Current



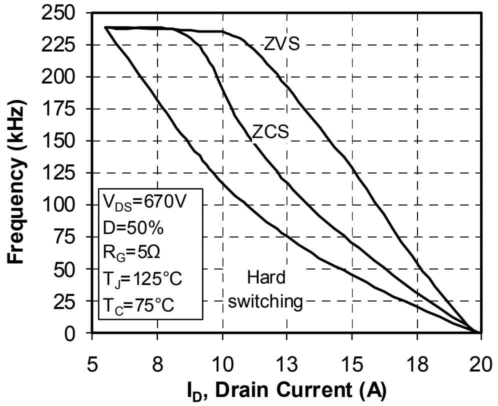
Switching Energy vs Current



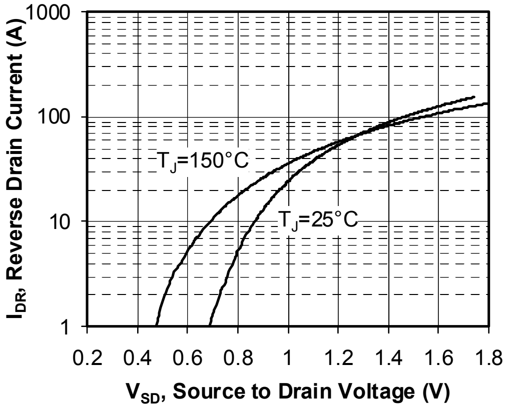
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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