

AUTOMOTIVE Dual N-Channel 60V 175°C MOSFET

FEATURES

- AEC-Q101 Qualified
- 100% UIS and R_g Tested
- 175°C Operating Junction Temperature
- Wettable Flank Package
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

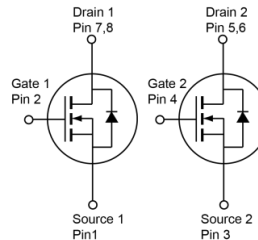
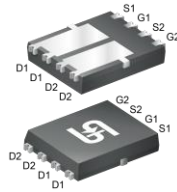
APPLICATIONS

- 12V Automotive Systems
- Solenoid and Motor Control
- Automotive Transmission Control
- DC-DC Converters

PRODUCT SUMMARY		
PARAMETER	VALUE	UNIT
V_{DS}	60	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	30
	$V_{GS} = 7V$	42.3
Q_g	20	nC



PDFN56U Dual



Note: MSL 1 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current (Note 1)	$T_C = 25^\circ\text{C}$	I_D	25	A
	$T_A = 25^\circ\text{C}$		6	
Pulsed Drain Current		I_{DM}	100	A
Single Pulse Avalanche Current (Note 2)		I_{AS}	13	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	25	mJ
Total Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	48	W
	$T_C = 125^\circ\text{C}$		16	
Total Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	2.5	W
	$T_A = 125^\circ\text{C}$		0.8	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +175	$^\circ\text{C}$

THERMAL RESISTANCE			
PARAMETER	SYMBOL	MAXIMUM	UNIT
Thermal Resistance – Junction to Case	$R_{\theta JC}$	3.1	$^\circ\text{C/W}$
Thermal Resistance – Junction to Ambient	$R_{\theta JA}$	61	$^\circ\text{C/W}$

Thermal Performance Note: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. The $R_{\theta JA}$ limit presented here is based on mounting on a 1 in² pad of 2 oz copper.

ELECTRICAL CHARACTERISTICS (T _A = 25°C unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	60	--	--	V
Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250μA	V _{GS(TH)}	1.8	2.6	3.8	V
Gate-Source Leakage Current	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Drain-Source Leakage Current	V _{GS} = 0V, V _{DS} = 60V	I _{DSS}	--	--	1	μA
	V _{GS} = 0V, V _{DS} = 60V T _J = 125°C		--	--	100	
	V _{GS} = 0V, V _{DS} = 60V T _J = 175°C		--	--	500	
Drain-Source On-State Resistance (Note 3)	V _{GS} = 10V, I _D = 6A	R _{DS(on)}	--	25	30	mΩ
	V _{GS} = 10V, I _D = 6A, T _J = 125°C		--	50	60	
	V _{GS} = 10V, I _D = 6A, T _J = 175°C		--	65	78	
	V _{GS} = 7V, I _D = 5A		--	26	42.3	
Forward Transconductance (Note 3)	V _{DS} = 10V, I _D = 6A	g _{fs}	--	26	--	S
Dynamic (Note 4)						
Total Gate Charge	V _{GS} = 10V, V _{DS} = 30V, I _D = 6A	Q _g	--	20	--	nC
Total Gate Charge	V _{GS} = 7V, V _{DS} = 30V, I _D = 5A	Q _g	--	14	--	
Gate-Source Charge		Q _{gs}	--	5	--	
Gate-Drain Charge		Q _{gd}	--	5	--	
Input Capacitance	V _{GS} = 0V, V _{DS} = 30V, f = 1.0MHz	C _{iss}	--	1020	--	pF
Output Capacitance		C _{oss}	--	69	--	
Reverse Transfer Capacitance		C _{rss}	--	24	--	
Gate Resistance	f = 1.0MHz	R _g	0.7	2.2	4.4	Ω
Switching (Note 4)						
Turn-On Delay Time	V _{GS} = 10V, V _{DS} = 30V, I _D = 6A, R _G = 2Ω	t _{d(on)}	--	3	--	ns
Rise Time		t _r	--	21	--	
Turn-Off Delay Time		t _{d(off)}	--	11	--	
Fall Time		t _f	--	15	--	
Source-Drain Diode						
Diode Forward Voltage (Note 3)	V _{GS} = 0V, I _S = 6A	V _{SD}	--	--	1.2	V
Reverse Recovery Time	I _S = 6A,	t _{rr}	--	17	--	ns
Reverse Recovery Charge	di/dt = 100A/μs	Q _{rr}	--	12	--	nC

Notes:

- Silicon limited current only.
- $L = 0.3\text{mH}$, $V_{GS} = 10\text{V}$, $V_{DD} = 30\text{V}$, $R_G = 50\Omega$, $I_{AS} = 13\text{A}$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: Pulse Width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- Switching time is essentially independent of operating temperature.

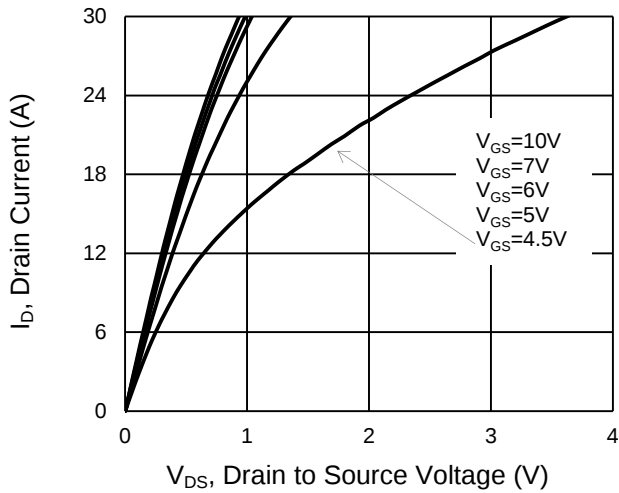
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TQM300NB06DCR RLG	PDFN56U Dual	2,500pcs / 13" Reel

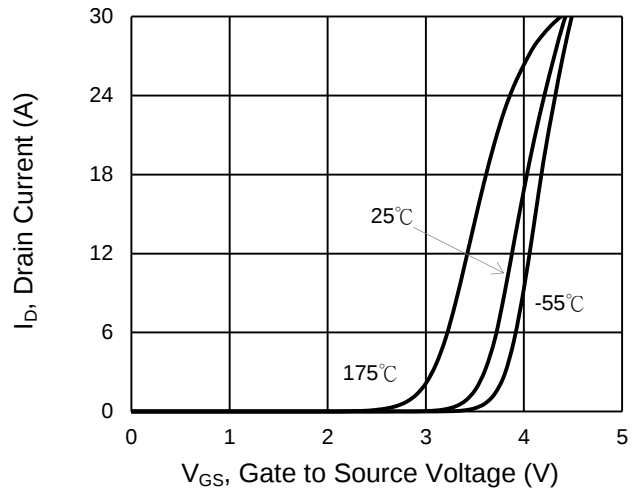
CHARACTERISTICS CURVES

($T_A = 25^\circ\text{C}$ unless otherwise noted)

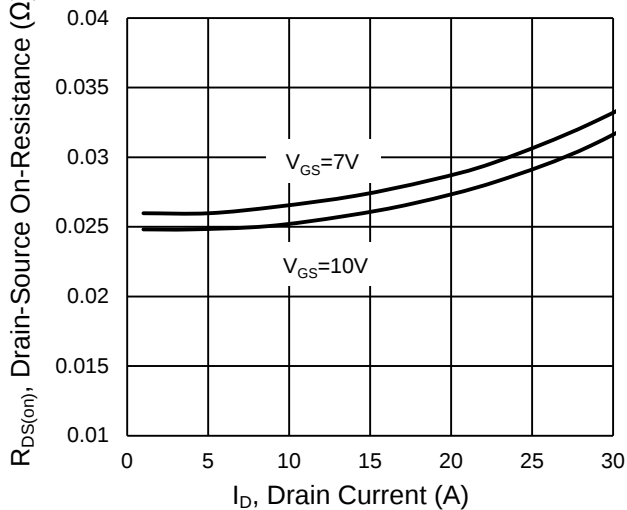
Output Characteristics



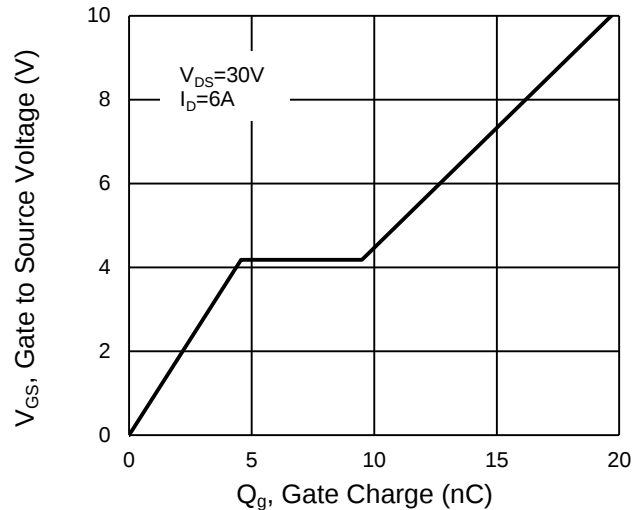
Transfer Characteristics



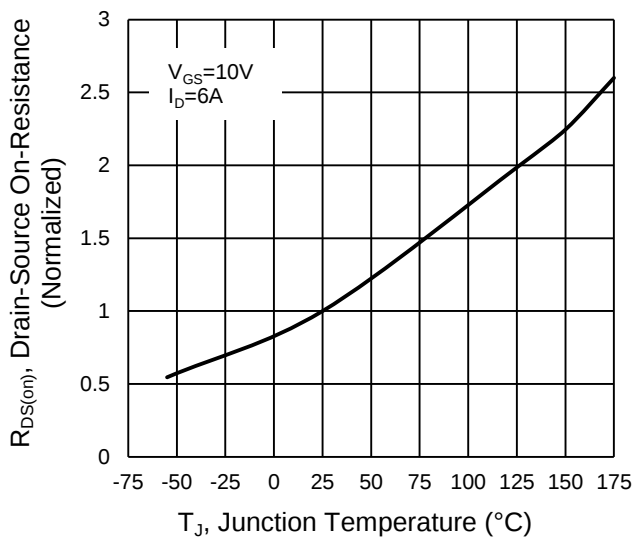
On-Resistance vs. Drain Current



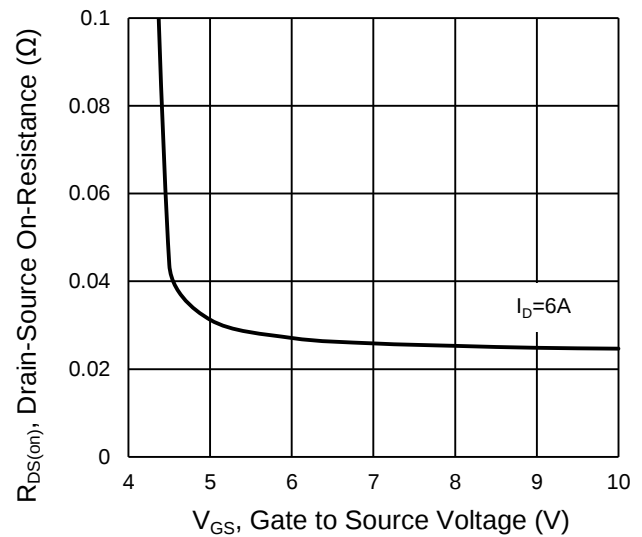
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



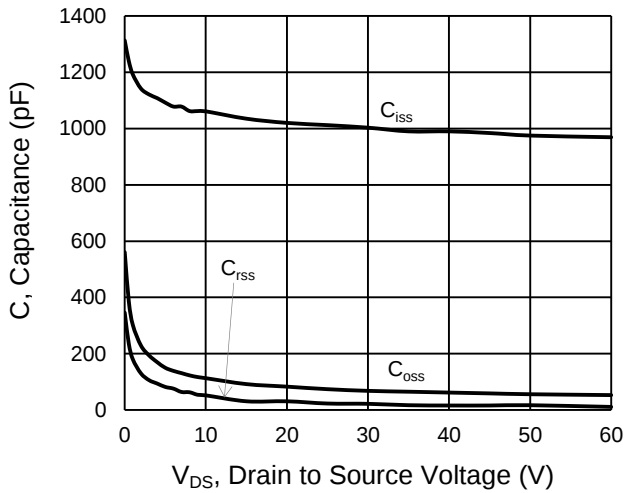
On-Resistance vs. Gate-Source Voltage



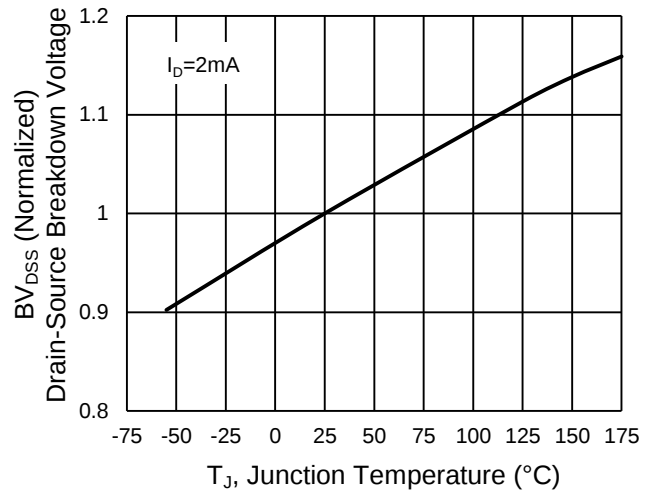
CHARACTERISTICS CURVES

($T_A = 25^\circ\text{C}$ unless otherwise noted)

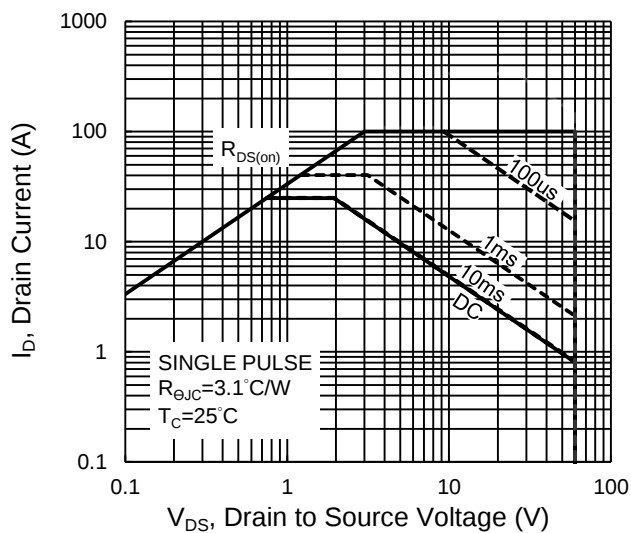
Capacitance vs. Drain-Source Voltage



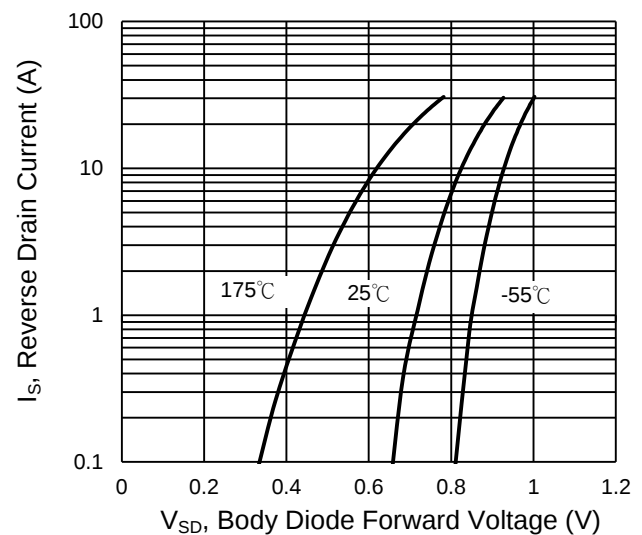
BV_{DSS} vs. Junction Temperature



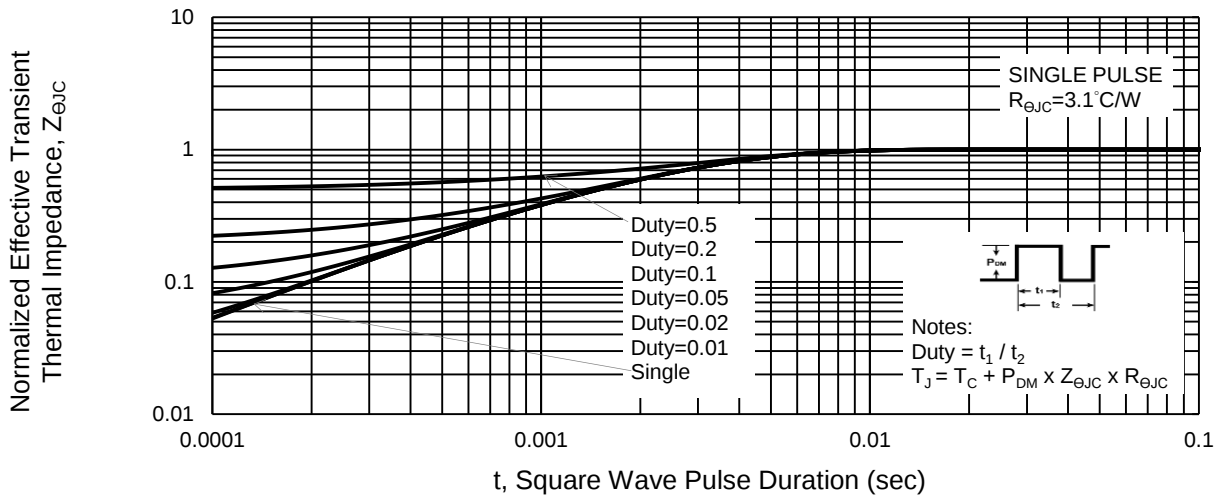
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

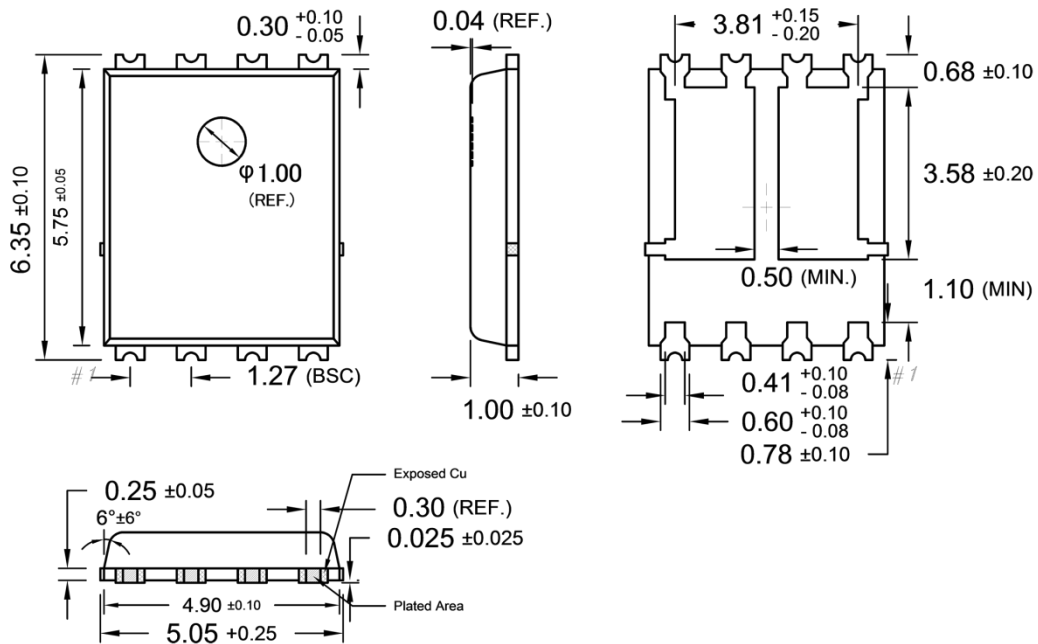


Normalized Thermal Transient Impedance, Junction-to-Case

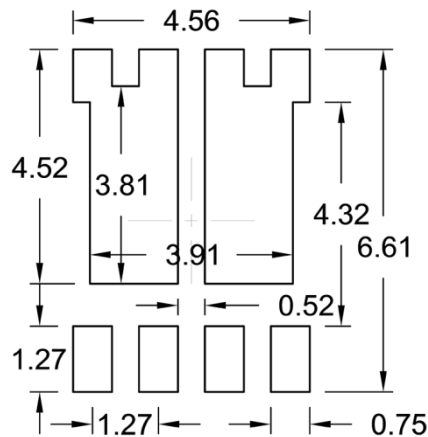


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

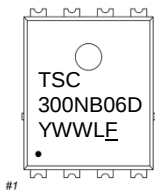
PDFN56U Dual



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



- Y** = Year Code
- WW** = Week Code (01~52)
- L** = Lot Code (1~9,A~Z)
- F** = Factory Code
- = AEC-Q101 Qualified

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